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PROTECTING OUR HEATHCARE HEROES: USING LATENT JD-R PROFILES
TO PREDICT BURNOUT IN EMERGENCY MEDICINE CLINICIANS
DURING THE COVID-19 PANDEMIC

A Thesis
Presented to
the Graduate School of
Clemson University

In Fulfillment
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Master of Science
Applied Psychology

by
Jordan Smith
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Accepted by:
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ABSTRACT

Burnout—a phenomenon characterized by emotional exhaustion, cynicism, and negative self-evaluations—is a very concerning and prevalent issue among clinicians, especially those in emergency medicine. Preliminary research conducted at the start of COVID-19 has noted that frontline clinicians are experiencing elevated rates of depression, anxiety, and fatigue, making them susceptible to burnout. In an effort to understand more about clinician burnout during COVID-19, the present study used Latent Profile Analysis (LPA) to examine what profiles containing combinations of job demands and job resources exist within emergency medicine clinicians and which profiles—if any—are predictive of emergency medicine clinician burnout during COVID-19. An employee survey of emergency medicine clinicians was used to conduct the exploratory LPA and find a best-fitting solution. Results revealed five unique JD-R profiles: Meaningful Work-Low Job Demands (MW-LJD), Autopilot, Burnout Risk, Sufficient Resources, and Meaningful Work-High Job Demands (MW-HJD). Using mean burnout scores and the BCH method, patterns of job demands and resources arose that revealed what JD-R combinations may lead to clinicians being more or less susceptible to burnout. Overall, the latent profiles differed on burnout scores, with Burnout Risk having the highest and Sufficient Resources having the lowest average burnout score. These differences in burnout scores, particularly between the extreme ends previously mentioned, indicates that the profiles could be used to predict clinician burnout. The findings of this study add to the limited understanding of how burnout can manifest in emergency medicine clinicians during a pandemic. This information could be used by organizations to identify

clinicians who are at risk of burnout as well to design and implement interventions that are data-driven, in order to more accurately prevent burnout and reduce the strain that results from job stressors.

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CHAPTER ONE

INTRODUCTION

Burnout, defined as “a syndrome of emotional exhaustion and cynicism that frequently occurs among individuals who do ‘people-work’” (Maslach and Jackson, 1981), is a surmounting issue in the medical community. Studies conducted in the United States estimate that substantial burnout symptoms are present in 35-54% of nurses and physicians and 45-60% of medical students and residents (National Academy of Medicine, 2019). Although staggering, these statistics aren’t very surprising as clinicians work in demanding environments and are often under high levels of stress. *Job demands*—aspects of the job that require sustained physical, emotional, or cognitive effort (Demerouti et al., 2001)—have been identified as the leading predictor of burnout (Lee & Ashforth, 1996). Common job demands include work overload, work pressure, stressful events, administrative burden, role stress, role ambiguity, and role conflict, all of which predict burnout (Lee and Ashforth, 1996; Alarcon, 2011; National Academy of Medicine, 2019). The continuous exposure to demands such as these make clinicians more likely to experience burnout.

Even before the SARS-CoV-2 (COVID-19), health care workers were especially vulnerable to burnout and poor mental health. However, given the extreme stressors faced by clinicians working during the pandemic, that vulnerability is growing. In the early months of 2020, COVID-19 started running rampant in the United States. Clinicians on the frontlines working tirelessly day in and day out to care for both COVID-19 and non-COVID-19 patients are particularly susceptible to stressors associated with the pandemic.

Photos and videos that depicted the reality of being a clinician during COVID-19 circulated the media—bruises from PPE, overwhelming amounts of frustration and sadness, and emotional and physical exhaustion. In one extreme case, a physician working in New York City—one of the hardest hit areas in America—took her own life as she grappled with the overwhelming demands of working in an emergency department during a pandemic.

The effects of these overwhelming demands on clinicians are somewhat unknown due to the recency and continuation of the COVID-19 pandemic; however, information can be gleaned from both studies on other global epidemics and pandemics along with preliminary COVID-19 studies, which point to health care workers being particularly vulnerable to negative psychological outcomes. A rapid meta-analysis identified high rates of prevalence in anxiety (45%), depression (38%), and acute stress disorder (31%) among health care workers during and after viral epidemics (Serrano-Ripoll et al., 2020). This is consistent with the study by Lai et al. (2020), who found that a considerable number of health care workers, particularly those who treated COVID-19 patients, reported experiencing symptoms of anxiety, depression, and insomnia during the pandemic. When data like these are combined with what is already known about stressors faced by clinicians and the outcomes they have, there is a sense of urgency that emerges to care about the wellbeing and health of clinicians. Thus, the aim of this study is to identify what may lead to burnout and if there are meaningful patterns of factors that predict emergency medicine clinician burnout during the COVID-19 pandemic.

In an attempt to identify predictors of burnout, this study integrates the *Job Demands-Resources (JD-R) model* (Demerouti et al., 2001) with a person-centric approach and proposes profiles that contain four indicators: general job demands, COVID-19-related job demands, internal job resources, and external job resources. Identifying what may make clinicians more susceptible to burnout during the COVID-19 pandemic is critical to creating successful preventative interventions that promote overall health and wellbeing. The results of this study provide insight into the risk factors for burnout in clinicians working the frontlines during COVID-19 with the hope that this information could be used to help prevent burnout by limiting certain demands and/or providing resources that could assist in mitigating the negative outcomes of working as a healthcare professional during a pandemic or extreme event such as a natural disaster or mass shooting.

CHAPTER TWO

CLINICIAN BURNOUT

Maslach and Jackson (1981) describe burnout as a “syndrome of emotional exhaustion and cynicism that occurs frequently among individuals who do ‘people-work’ of some kind”. Burnout, according to Maslach and Jackson (1981) is characterized by three symptoms: emotional exhaustion, cynicism, and negative evaluations of oneself. Emotional exhaustion is what Maslach (1993) considers the “core meaning” of burnout. When someone is emotionally exhausted, they have an absence or depleted number of emotional resources and thus, feel unable to do their work from a psychological standpoint. Emotional exhaustion can lead to outcomes such as dehumanization of patients, carelessness, workplace injuries and near-misses, loss of meaning, and decreased job satisfaction (Maslach and Jackson, 1981; Li, Jiang, Yao, & Li, 2013). Cynicism—known also as depersonalization—refers to negative feelings that one holds about their patients or clients, which often stems from emotional exhaustion. Lastly, Maslach and Jackson (1981) describe negative feelings towards oneself as being unhappy and dissatisfied with both the job and the accomplishments made on the job.

Burnout is most often seen in occupations with high-stress, ambiguous, and frustrating work environments. One field that has been strongly linked to burnout and continues to gain popularity in the literature is health care. Individuals who engage in patient care, such as clinicians (e.g., physicians, APPs, nurses), are particularly vulnerable to burnout (McHugh et al., 2011; Chung et al., 2020). Although patient care can be rewarding, it can also be stressful and emotionally draining. While work stress is

unavoidable, large amounts of it can lead to negative outcomes. Chronic work stress is often emotionally draining, which puts individuals at risk for burnout.

Although healthcare professionals are particularly vulnerable to burnout due to the extreme and persisting work demands they face, some clinicians are at a higher risk than others. Hyman et al. (2017) found more burnout risk characteristics in residents compared to attending physicians and nurses as well as differences in burnout rates between specialties. Compared to individuals in other careers, burnout rates of practicing physicians are higher, even when controlling for occupational factors such as work hours (West et al., 2018). The study by West et al. (2018) only looked at physicians in comparison to other careers, however, it is likely that similar results would be found for other types of clinicians—such as nurses and advanced practice providers—compared to other professions.

The high clinician burnout rate has received attention in recent years because of its devastating effects. Negative mental and physical health outcomes such as depression, reduced immunity, somatic and physiological arousal, occupational injury, alcohol abuse/dependence, fatigue, and increased risk of motor vehicle crashes are all associated with burnout (Garrosa et al., 2010; West et al., 2018). One of the most alarming consequences of burnout for physicians, in particular, is a doubled risk of suicidal ideation. This is in addition to the already high rate of physician suicide compared to the rest of the population, with male physicians having a 40% higher rate and female physicians having a 130% higher rate than their non-physician counterparts (West et al.,

2018). These devastating statistics are why physician burnout is now considered a health crisis in the United States.

Burnout not only has implications for clinician health but also patient care and the health system as a whole. Patient care outcomes such as longer recovery time, reduced patient safety, suboptimal care, higher rates of medical errors, and lower patient satisfaction scores have been linked to clinician burnout (Dewa et al., 2017; West et al., 2018). With the aforementioned consequences taken into consideration, it is safe to say that clinician burnout can have a negative impact on the safety of patients. The effect of clinician burnout is much like a ripple in the water and goes so far as to negatively impact the financial wellbeing of entire health systems. Burnout is associated with organizational outcomes such as turnover, increased rates of medical errors, absenteeism, and decreased productivity—all of which carry a monetary cost (West et al., 2018). Turnover is especially costly to health care organizations. In their investigation of turnover costs, Shanafelt et al. (2017) found that the cost to replace a single physician ranges between hundreds of thousands to over a million US dollars.

The prevalence of burnout among clinicians as well as the negative effects burnout has on clinician health and wellbeing, patient care, and organizational health make a strong case as to why people should care about burnout and why organizations should take action to combat it. The core of the burnout issue lies in the health care organizations themselves, as the focus has shifted to efficiency, never-ending increases in performance expectations, and profit over quality, patient care, and employee wellbeing. Thus, it is up to the healthcare systems to make a change.

Although there is less literature on burnout interventions than antecedents, one overarching theme prevails—the necessity of a systematic approach. With the help and support of the National Academy of Medicine (NAM)—a subgroup of the National Academies of Sciences, Engineering, and Medicine (NASEM)—an ad hoc committee created a systems model that highlights the importance of collective and coordinated action in the fight against clinician burnout (National Academies of Sciences, Engineering, and Medicine, 2019). The committee argues that it is the interaction between the external environment, care teams, and the healthcare organization that ultimately influences the occupational elements that contribute to burnout and wellbeing in clinicians and learners, which influences outcomes of patients, clinicians, society, and the healthcare organization. The systems approach put forth by the committee means there are many factors that impact clinician burnout, and even more so now due to the COVID-19 pandemic. Learning and improving based on evaluations of outcomes are key to this approach. If there is no learning or improvement, the system stays the same, and therefore, the outcomes do not change. Therefore, this study aims to identify meaningful patterns of factors contributing to clinician burnout using a person-centric approach. This patterned approach can subsequently inform actions and interventions to combat burnout within healthcare organizations during the current pandemic and beyond.

CHAPTER THREE

THE JD-R MODEL

This study takes a system-level approach by examining burnout through the lens of the *Job Demands-Resources (JD-R) Model*, an occupational stress model which posits that work can be categorized into two groups, job demands and job resources (Demerouti et al., 2001). This particular model was chosen because job demands and resources are predictive of job burnout and the overarching goal of this study is to identify predictors of burnout in emergency medicine clinicians.

Applying A Person-Centered Approach

A person-centered approach is taken in this study because it is holistic in nature and has advantages over variable-centered approaches such more detailed results and the ability to compare different levels of variables (Meyer & Morin, 2016; Mammadov et al., 2016). The overall goal of this research is to predict burnout in emergency medicine clinicians using job demands and resources. Since there is not a single path to burnout, it is likely that there are subgroups (i.e., profiles) that exist which contain various patterns of job demands and resources that can predict burnout susceptibility. The identification of these subgroups is classified as a person-centered approach, which is preferable to a variable-centered approach in the context of this thesis as my goal is to determine what patterns of job resources and job demands exist that make emergency medicine clinicians more or less susceptible to burnout. The person-centered approach will allow for a better understanding of burnout, the combinations of job demands and resources could predict burnout, and what interventions could be implemented—based on the different

subgroups—to reduce the strain of burnout symptoms and prevent frontline emergency medicine clinicians from burning out during a global pandemic.

There is no single reason why people burn out. Antecedents to burnout are often a combination of stressors faced at work, the resources that are available to deal with those stressors, and the personal characteristics that make someone more or less susceptible to burnout. In their meta-analysis, Lee and Ashforth (1996) found that the best predictor of burnout is job demands, which are defined by Demerouti and colleagues (2001) as “aspects of the job that require sustained physical, emotional, or cognitive effort”. It should also be noted that the duration of exposure to job demands plays an important role in employee outcomes in that the longer one is exposed to job demands, the more likely they are to experience burnout. Meta-analyses on the relationship between job demands and burnout have found that job demands such as work overload, work pressure, stressful events, administrative burden, role stress, role ambiguity, and role conflict are predictive of burnout (Lee and Ashforth, 1996; Alarcon, 2011; National Academy of Medicine, 2019). Furthermore, the three burnout dimensions differ in the job demands that best explain them. A study on job stressors and burnout found that emotional exhaustion is highly related to work overload, depersonalization is highly related to consistent exposure to pain and death in the workplace, and low levels of personal accomplishment is highly related to lack of cohesion and role ambiguity (Garrosa, Rainho, Moreno-Jimenez, & Monteiro, 2010).

Job resources also play a role in the burnout process as they are negatively related to job demands such that more job demands coincide with fewer job resources and

vice-versa. Job resources diminish job demands and mitigate the negative effects they have on employees. Thus, when job resources are limited, job demands are not reduced and the risk of burnout is heightened (Schaufeli & Bakker, 2004). In their study, Bakker et al. (2005) found that high demands and low job resources have a significant impact on predicting burnout, specifically the sub-areas of emotional exhaustion and cynicism. Social support, autonomy, feedback, and positive relationships with supervisors were identified as job resources that serve as a buffer to the negative impact of emotional and physical demands, work overload, and lack of work-life balance, which ultimately resulted in lower levels of burnout. In the paragraphs that follow, I will review the literature pertaining to general job demands, COVID-19-related job demands, and job resources—each of which were elements of the proposed profiles.

General Job Demands for Clinicians

Clinicians are known to have a work environment that is particularly demanding, fast paced, and stress inducing. Demands such as workload, work hours, bureaucratic tasks, staffing, and emotional stimuli are commonly faced by clinicians and often have negative effects when effective coping mechanisms and resources are not available or used. Poor overall health, absenteeism, burnout, and medical errors are just a few of the outcomes that studies have identified as being associated with clinician job demands (van der Heijden et al., 2008; Dzau et al., 2018). The next few subsections will contain literature reviews that take a deeper look into the job demands commonly faced by clinicians.

Workload

Workload is one of the most prevalent job demands faced by employees across all industries and is no exception for the healthcare sector. This is especially an issue in the emergency department where there is often a sizable difference between the number of patients and the number of clinicians on staff that results in overflow, which can lead to long wait times and lower quality of care. One study that looked specifically at emergency medicine physicians found that when workload was perceived to be high, patient satisfaction scores were lower and emotional exhaustion levels in physicians were higher (Watson et al., 2018). As with most of the prevailing clinical job demands, work overload has been identified as a risk factor for burnout in that burnout is more prevalent among individuals who have higher workloads (Boutou et al., 2019). Research suggests that not only is the sheer amount of work a demand, but also the control that clinicians have over their workload. Thus, those who have high workloads and perceived control over those workloads have a lower risk of experiencing strain compared to those who perceive the control over their workload to be low, regardless of how small or large their workload is (Kroth et al., 2019).

Work Hours

Excessive work hours (e.g., overtime), long working shifts, and nontraditional work hours are common job demands faced by clinicians. In one study by Luther et al. (2016), approximately half of clinicians reported working overtime. These individuals had higher levels of work-life conflict and burnout and lower quality patient care and job satisfaction compared to those not working overtime. The association between excessive work hours and burnout has been identified in other studies and is more common among

clinicians practicing emergency medicine compared to physicians in other specialties (Arora et al., 2013; Dzau et al., 2018).

Clinicians that work in a hospital setting will often have long hours, rotating shifts (e.g., switching between days, evenings, and nights), and work a lot of nights and weekends, which is often referred to as shift work or non-traditional work hours. As a result of working abnormal hours, physical health, mental health, and cognitive functioning are often negatively impacted (Boggild and Knutsson, 1999; Costa, 2003; Potter et al., 2016). The most common and direct physical outcome of shift work are sleep-related issues such as sleep deprivation, decreased sleep quality, and increased sleepiness (Gold et al., 1992; Smith-Coggins et al., 1994; Harrison et al., 2019). Extended shifts (more than 8 hours), which are common among shift workers in the healthcare industry, are also related to excess fatigue. Disruption to the circadian rhythm and sleep/wake cycles of clinicians working non-traditional hours can lead to decreases in cognitive functioning—e.g., reaction time, memory, and learning ability (Gold et al., 1992; Smith-Coggins et al., 1994)—which ultimately puts the safety of both clinicians and their patients at risk.

Emotional Demands

Death, suffering, grief, and agitated patients are all emotional job demands faced by clinicians. The literature suggests that emotional job demands are especially concerning, as they have been linked to serious negative outcomes in clinicians such as emotional exhaustion (Escriba-Aguir & Perez-Hoyos, 2007), reduced well-being (Wallace & Lemaire, 2007), PTSD (Mills & Mills, 2005), and burnout (Bragard et al.,

2015). Furthermore, emotional demands have been linked to poor organizational outcomes such as ineffective team behavior (Gevers et al., 2010), job dissatisfaction (Wallace & Lemaire, 2007), and decreases in clinician-perceived patient safety (Ramanujam et al., 2008).

Emergency medicine clinicians are particularly susceptible to emotional job demands because they are the first line of care for trauma patients. Being exposed to and treating child trauma victims, burn victims, and violent patients as well as having to communicate and interact with friends and family of patients have been reported by EM clinicians as the most traumatic work demands they face (Somville et al., 2016). Other traumatic events that EM clinicians are exposed to include gunshot and stab wounds, severe injuries from motor vehicle accidents, heart attacks, and strokes. Continuous exposure to these emotional demands has been linked to a multitude of psychological outcomes such as depression, irritability, anger, and burnout as well as organizational outcomes like absenteeism, turnover, and job dissatisfaction (Somville et al., 2016).

Other General Clinician Job Demands

Although not as dominant in the literature, clinician strain has also been linked to other characteristics and features of the clinical environment such as non-solo practice, Electronic Health Records (EHRs), and staffing issues. Non-solo practices, such as clinicians who work for a health system or a Federally Qualified Health Center (FQHC), are more likely to burn out than clinicians who practice solo (Edwards et al., 2018). The authors concluded that this finding is likely explained by levels in autonomy and thus, it

is not necessarily the practice itself that influences burnout, but rather the level of autonomy that clinicians experience at each practice.

EHRs are often looked at by clinicians as a necessary evil of their work environment. However, EHRs can be more than just an annoyance. Slow response times, reduced patient-clinician interaction, information overload, inability to access patient data from other health care facilities, notes focused on billing rather than the patient, and excessive data entry are all EHR-related concerns associated with high levels of clinician stress (Kroth et al., 2019).

Emergency departments all over the world consistently battle with staffing-related issues. Factors such as clinician efficiency, patient volume, and bed availability all need to be taken into consideration (Stenson et al., 2020). Staffing shortages—especially with nurses—are a common issue in emergency departments and are often cited as a source of stress among EM clinicians (Flowerdew et al., 2011). Such shortages can also have organizational impacts such as overcrowding, longer patient waiting times, longer hospital stays, increased mortality rates, and lower patient satisfaction rates (Hoot & Aronsky, 2008; McCusker et al., 2014).

Clinician Job Demands Unique to the COVID-19 Pandemic

In addition to the job demands typically faced, clinicians are also experiencing a flood of new job demands unique to the COVID-19 pandemic. Life and death situations are dealt with by clinicians day in and day out, however, the added stress of putting one's own life at risk because of exposure to COVID-19 creates a real sense of danger (Santarone et al., 2020). Clinicians have a heightened level of vulnerability to COVID-

19-specific job demands because they are frontline workers who see the impacts of the virus and, in some cases, actually care for COVID-19 patients. Front-line health care workers have been cited as being at least three times as likely to contract COVID-19 than the general public, even when other risk factors are accounted for (Nguyen et al., 2020). Emergency medicine clinicians hold concerns about exposure because they are often the first line of care for individuals who come to the hospital. COVID-19 presents a unique challenge, however, as not all cases are symptomatic. Therefore, emergency medicine clinicians have to be extra cautious when interacting with patients as COVID-19 status of patients may not always be obvious or known, which is an added stressor.

Spikes in the number of cases have resulted in an “all hands on deck” approach in hospitals, which coincides with a greater workload, longer and/or more working hours, and an increased duration of exposure to stressful and emotionally draining events. Additionally, the more time that clinicians spend at work, the higher their risk is of contracting COVID-19. The research that has been conducted on clinicians during the pandemic has shed light on the unprecedented job demands they have to face. Over the next two sections of this paper, I will introduce, review the literature on, and discuss COVID-19-related job demands and their effects on clinician health and wellbeing.

PPE and Exposure

One of the most salient job demands faced by clinicians during COVID-19 were concerns about PPE, such as availability and quality. In research conducted on clinicians working during COVID-19, especially during the early months of the pandemic (i.e. March and April), PPE was consistently cited as one of the top concerns/stressors at work

(Halcomb et al., 2020). In a Chinese province adjacent to that of the epicenter, medical workers identified concerns about the safety and health of themselves and their families as major sources of anxiety (Cai et al., 2020). This stressor is rooted in fears over personal safety and exposure as PPE is the main line of defense when clinicians are treating COVID-19 patients. In some instances, hospitals have not had the proper amount of PPE which leads to unsafe practices, such as reusing masks, which ultimately heightens the exposure concern. The emergency department is particularly at-risk because of its propensity to be overcrowded. Thus, a lack of rigor in adherence to safety protocols and practices within emergency departments can increase the risk of exposure among clinicians and other patients (Adams & Walls, 2020).

In addition to the fear of being exposed themselves, a lot of clinicians have an even larger fear of exposing family to the virus. One study on physicians, advanced practice providers, and registered nurses in New York City reported that 74% of respondents rated ‘concerns about transmitting COVID-19 to family and loved ones’ as being extremely distressing, which was the highest rate among all twenty-four concerns that were included in the study (Shechter et al., 2020). This fear can result in an action such as self-isolation to prevent contamination, or a constant feeling of guilt about possibly infecting family members—both of which have the potential to produce negative psychological outcomes such as anxiety, depression, and a higher risk of suicide (Santarone et al., 2020).

Other COVID-19 Job Demands

In addition to PPE and exposure, clinicians have cited many other clinical work environment demands such as uncertainty about the pandemic itself, job security, constant exposure to highly emotional situations, decisions about the allocation of scarce resources, and shortages of supplies and medications (Shechter et al., 2020). Due to inadequate knowledge about COVID-19, a lot of uncertainty surrounded the danger of the virus, how it spreads, what can be done to reduce the spread, and the effectiveness of practices such as social distancing and wearing a mask. These uncertainties add to the anxiety and fear held by clinicians regarding the risk of exposure and exposing others (Mason & Friese, 2020). Uncertainty also exists about the timeline of the COVID-19 pandemic, which has led to concerns about economic stability due to many workers being furloughed or terminated (Wilson et al., 2020). Clinicians, therefore, are not only facing threats to their health by working but are also facing threats to job security and their financial wellbeing.

Caring for COVID-19 patients can be emotionally taxing for clinicians because of how the virus acts in severe cases. Witnessing health declines, suffering, and death is part of being a clinician, however, continued exposure to these events can have negative psychological impacts such as emotional exhaustion and feelings of helplessness. This was the case with COVID-19, as many hospitals saw a surge in very ill patients and in some areas, a surge in deaths. New York City, for example, at the peak of the pandemic in April had a death rate almost six times larger than the city's average, which amounted to one death approximately every two minutes (Feuer & Rashbaum, 2020).

Another source of emotional strain in clinicians working the frontlines are medication and supply shortages. The ultimate goal of clinicians is to administer high quality care that will yield the best patient outcomes. COVID-19 made this goal hard, however, as the demand for equipment and medications needed to care for COVID-19 patients greatly outnumbered the supply. For individuals with severe cases of COVID-19, being put on a ventilator may be the only chance at survival. Particularly during case surges, however, there were not enough ventilators for the number of patients who needed them. Clinicians were therefore faced with the harsh reality that some patients in need of a ventilator would not be put on one and would essentially be left to perish. For emergency medicine clinicians, emotional and psychological strain can emerge from having to triage patients knowing that not everyone will get the care they need because of limited ICU beds and ventilators (Santarone et al., 2020).

The studies that have been published on outcomes of healthcare professionals who worked during COVID-19 support the claim that a large percentage of frontline clinicians feel emotionally and psychologically strained. Among clinicians who assisted in caring for COVID-19 patients in Italy, over one-third cited experiencing emotional exhaustion and twenty-five percent cited experiencing depersonalization (Barello et al., 2020). In New York City, researchers found that frontline clinicians at one major hospital had a fifty-seven percent positive screen rate for acute stress, forty-eight percent for depressive symptoms, and thirty-three percent for symptoms of anxiety (Shechter et al., 2020). These concerning statistics are likely the result of unique job demands that

emerged due to COVID-19 in addition to the pre-existing job demands that were present before the pandemic.

Clinician Job Resources

Job resources are physical, psychological, social, or organizational aspects of a job that may do any of the following: (a) reduce job demands and the associated psychological and/or physiological costs; (b) achieve work goals; (c) stimulate personal learning, development, and growth (Schaufeli and Bakker, 2004). When job resources are in abundance, the *motivational process* is triggered and in turn, employees become more energized and engaged in their work, resulting in positive organizational outcomes such as better work performance, intention to stay, and organizational commitment (Schaufeli, 2017). However, when resources are absent or limited, individuals become more withdrawn and have a difficult time coping with the demands of their work environment. In addition to work engagement, job resources also play a key role in the occupational burnout process. As previously mentioned, low levels of job resources combined with high levels of job demands contribute to burnout. Therefore, job resources are able to spark work engagement and fight against burnout, making them an essential part of employee health and well-being. The subsections to follow will contain literature reviews of specific job resources that are relevant to the clinical work environment and are likely to be of particular importance during a global pandemic.

Social Support

Social support, the extent to which a person has individuals in their environment who help them with stressors and provide emotional support, is a commonly used coping

resource by people of all ages (Osipow et al., 1985). However, there is a lack of consensus in the literature as to the effectiveness of social-focused coping (Jenkins & Elliot, 2004). A review of the social support literature by Buunk (1990) revealed that social support is modestly related to indicators of psychological health and well-being and rarely associated with objective health measures. Furthermore, there are many studies that have found no associations and some studies that have actually found evidence of a negative relationship between better mental health and social support, which is referred to as a *reverse buffering effect* (Buunk, 1990). There are studies, however, that have found social support to be an effective job resource that can reduce strain (Mahat, 1998; Yildirim et al., 2017).

According to Beehr and McGrath (1992), social support is an effective treatment for occupational strain because it can either weaken the strength of the stressor itself, reduce anxiety directly, or interact with the stressor to weaken its effects. Garcia-Herrero and colleagues (2013) used Bayesian networks to analyze the relationship between occupational stress, job demands, and social support. Findings from their research showed that workers who had social support were less likely to experience strain from work overload and intellectual demands compared to their colleagues who lacked social support. Other studies have also noted that a lack of social support is associated with negative outcomes such as depression and other psychiatric illnesses (Caplan et al., 1975; Stansfeld et al., 1998). These findings may indicate that resource loss is much more salient than resource gain such that a lack or absence of social support is much more impactful than having or gaining social support.

Colleagues and supervisors are often the sources of social support for employees who are facing stressors at work. These sources are often distinguished in the literature because they provide different types of support and are useful in different contexts. Colleague support is helpful for getting work done and has been shown to reduce work overload, strain, risk of burnout, and other negative pathological outcomes. Having a high-quality relationship with and getting support from one's supervisor has been shown to ease the strain of job demands, reduce burnout, aid in acts of coping, and enable good performance (Bakker et al., 2005). Colleague and supervisory support are not always equally effective. For example, LaRocco et al. (1980) identified co-worker support as having a greater buffering effect compared to supervisor support. Conversely, the Buunk (1990) literature review concluded that supervisor support is more effective than co-worker support in reducing adverse reactions to stress.

Although slightly conflicting, research findings regarding the effects of social support on clinician outcomes also are relatively positive and promising. Since clinicians face particularly unique job demands that people in other occupations may never experience, social support from colleagues and supervisors can be especially helpful. Due to their knowledge of the clinical working environment, clinicians are better able to empathize with and understand job-related stressors that fellow employees may be struggling with. Studies conducted on nurses have found that social support is negatively related to job stress (Van Bogaert et al., 2014), job strain (Yu et al., 2014), turnover intentions (Orgambidez-Ramos & de Almeida, 2017), and depressive symptoms (Saijo et al., 2018); and positively related to resilience (Yu et al., 2019), job engagement, and

satisfaction (Van Bogaert et al., 2014). Additionally, social support can aid in preventing burnout among both nurses and physicians (Ilic et al., 2017; Velando-Soriano et al., 2020). Although research on social support is quite sparse for physicians, there is evidence that physicians value the social aspect of their work. Banner Medical Group (BMG) identified reasons why physicians leave unexpectedly and found that a sense of community is one of the top three factors that physicians seek in their careers and ‘helping hands’ is seen by clinicians as an important contributor to job satisfaction (Cohn et al., 2009).

Social support has been a critical job resource for clinicians working on the frontlines during COVID-19. Preliminary research shows that clinicians who perceive their social support to be high have lower levels of COVID-19-related anxiety (Labrague & De los Santos, 2020), general anxiety, and stress (Xiao et al., 2020). Social support was also found to be associated with both sleep quality and self-efficacy, and, in one group of healthcare workers from Wuhan city P.R., China, a lower likelihood of developing posttraumatic stress disorder (PTSD) one month after the COVID-19 peak in China (Zhang et al., 2020). On the other hand, clinicians who had poor social support during COVID-19 are more likely to experience negative psychological outcomes such as depressive symptoms, stress, insomnia, and anxiety (Spoorthy et al., 2020).

Meaningful Work

Helping professions are known to be particularly stressful because of the exposure to suffering, pain, and death. However, at the heart of individuals who do this kind of work is a passion for helping and healing others. This sense of passion and belief that the

work they do is meaningful serves as a powerful buffer to unavoidable work stress that is constantly endured. Although there is no consensus on the definition of meaningful work, a thorough review of the literature shows that researchers agree that the definition includes some element of ‘significance’ or ‘purpose’ (Rosso et al., 2010). An increasing number of researchers are latching onto the idea that meaningful work is rooted in the perception of work as a ‘personal calling’ as opposed to just a job or a way to make money (Bunderson & Thompson, 2009).

Meaningful work is sought after by many individuals, most likely because it is human nature to make meaning. Drawing off of this idea and other meaningful work studies in the humanities, Lips-Wiersma and Morris (2009) argue that meaning is not provided—which is a common theme in management studies—but rather it comes from within and is manifested when an individual chooses to act in alignment with such meaning (e.g., choosing a career path that aligns with one’s values and morals). This study uses the aforementioned explanation by explanation by Lips-Wiersma and Morris (2009) as its accepted definition of meaningful work.

There are many benefits that can be derived from having an occupation that is meaningful. Based on studies they have done, Steger and Dik (2009) believe that meaningful work can lead to an increase in a person’s perception of the level of meaningfulness in their own life. People who view work as a *calling*—“belief that one’s career is a central part of a broader sense of purpose and meaning in life and is used to help others or advance the greater good in some fashion” (Duffy and Dik, 2013, p. 429)—often have a greater sense of well-being, less psychological distress (e.g.

depression and hostility), positive attitudes about work, and are more satisfied with their job (Steger and Dik, 2009).

Medicine is an occupation that is often examined in meaningful work studies. The medical field is special because it tends to attract people who seek meaning in their life and who find meaning in helping and serving others. Based on interviews with nurses about meaningful work moments, Pavlish and Hunt (2012) identified connection, contribution, and recognition as primary themes of meaningful work. All participants in the study cited relationships with the patient and their family as being a particularly meaningful part of nursing. Empathy is a common characteristic of nurses, as they find it important to put themselves in the patient's position and treat them as if they were a family member or close friend. Without being prompted, participants shared the positive impacts of meaningful work, which included feelings of accomplishment, a higher level of satisfaction with their work, being fulfilled, having a sense of purpose, feeling as though they are doing something worthwhile, and improved job performance (Pavlish and Hunt, 2012). These findings are not unique to the study conducted by Pavlish and Hunt (2012). In their investigation on job engagement, Dempsey and Reilly (2016) found that feelings about work (e.g., "My work is meaningful" and "I like the work I do") were the highest scoring items among nurses. Higher scores on these items were related to higher levels of engagement, which plays a factor in reducing negative psychological outcomes commonly seen in nurses such as compassion fatigue and burnout (Dempsey & Reilly, 2016).

The ability to connect with people and make a difference is often at the core of meaningful work for clinicians. Although the aforementioned studies looked at meaningful work in nurses, studies on other types of clinicians (e.g., physicians) have had similar findings. Meaningful, difference-making work has been identified as one of the top sought-after career elements among physicians (Cohn et al., 2009). Physicians identify meaningful work as a factor that is intrinsic to the work that they do (Schrijver et al., 2016).

Research suggests that this sense of meaning is very beneficial to clinicians since it serves as a buffer to the negative effects of stress and is associated with lower burnout levels (Dobler et al., 2017; Callahan et al., 2018). Patient care is especially important to physicians, and thus, tasks that take away from face-to-face patient care can lead to higher levels of burnout (Dillon et al., 2020). On the contrary, time allocated to meaningful work tasks, such as direct patient care, is a predictor of physician well-being (Webber et al., 2020). Overall, it can be gathered from the research that meaningful work is especially important to clinicians and can produce positive outcomes such as well-being and job satisfaction.

Leadership Support

Leaders are critical to organizations because they have a strong influence on both organizations and individual employees. During extreme and stressful situations, the actions and behaviors of leaders can either soothe or intensify employee outcomes (Hannah et al., 2009). This direct impact that leaders have on their subordinates is important because of the relationships that exist between leadership and employee and

organizational outcomes. Studies on the healthcare sector have found that leadership is positively associated with patient quality, patient outcomes, safety climate, and work environment health and negatively related to psychological distress and anxiety (Sfantou et al., 2017; Zhao, 2020).

Supportive, *inclusive leadership*—"words and deeds by a leader or leaders that indicate an invitation and appreciation for others' contributions" (Nembhard & Edmondson, 2006)—which holds the same characteristics as leadership support, was identified by Zhao et al. (2020) as a particularly important resource for clinicians working during the COVID-19 pandemic. Supportive leaders are often visible, accessible, available and encourage and acknowledge the hard work and sacrifices of their subordinates. This is beneficial because it sends a message to employees that their leadership cares about them, they are not alone, and that their sacrifices and care for others are noticed and appreciated.

A study on a group of clinicians from the epicenter of the COVID-19 pandemic found that inclusive leadership was negatively related to psychological distress and positively related to psychological safety (Zhao et al., 2020). Since psychological distress (e.g., emotional exhaustion, anxiety, and depressive symptoms) and psychological safety are associated with burnout, it is likely that supportive leadership is an effective job resource in decreasing clinician burnout, especially in the midst of a global health crisis (Zou et al., 2016; Swensen et al., 2018).

Using the JD-R Model as a Framework for Clinician Profiles

To connect the JD-R model to clinician burnout, this study takes a person-centered approach by proposing latent profiles made up of job demands and resources to predict EM clinician burnout during COVID-19. Although burnout at its core is a result of high work demands and low resources, the specifics vary greatly. Since individual differences are present among burnout antecedents, it is advantageous to pursue a person-centered approach as opposed to a variable-centered approach. The categorical nature of person-centered approaches allow for greater detail regarding the different combinations of job demands and resources that exist among clinicians. Profiles can provide more information about the amount of job demands and resources over and above “high” and “low”. Additionally, the profile approach is more holistic as it allows researchers to see what combinations of clinician job demands and resources are present and how the difference in these combinations can impact burnout levels. Profile analysis, therefore, identifies patterns and differences among job demands and resources of clinicians and reveals subgroups which this study proposes will be predictive of burnout.

CHAPTER FOUR

LATENT JD-R PROFILES PREDICTING CLINICIAN BURNOUT DURING THE COVID-19 PANDEMIC

The issue of burnout is so pervasive that it was identified as a serious health issue by the World Health Organization (WHO). In 2014, a sample representing physicians in the United States revealed that burnout symptoms were present in 54% of individuals, which is twice the rate of the general population (Shanafelt et al., 2015). It is also widely known that burnout is a common problem in the nursing profession and is a large contributor to turnover rates and staffing issues (McHugh et al., 2011). Among physicians, burnout is of particular concern as their rate of suicide is much higher than that of other occupations, and burnout has been cited as a contributing factor (West et al., 2018).

Since the start of the COVID-19 pandemic, burnout has become even more of a concern. Clinicians working the frontlines have seen an increase in psychological distress such as emotional exhaustion, depersonalization, depression, anxiety, and PTSD. Thus, the goal of this study is to identify predictors of burnout in clinicians so that data-driven interventions and resources can be created and implemented to prevent burnout. To achieve this, I am proposing clinician profiles that use the JD-R model as a framework to predict burnout from a person-centric perspective. This person-centered approach is superior to a variable approach as it acknowledges the likely existence of multiple subgroups within a sample. Instead of looking at variables in isolation, person-centered approaches look at variables as a system which results in a creation of patterns within and differences between samples of individuals (Meyer & Morin, 2016).

Published studies that have used profile analysis highlight the added benefits of a person-centered approach. Profiling research has led scholars to make more detailed discoveries—many of which would not have been possible using a variable-centered approach—about various applied psychology constructs such as the potential for the burnout process to follow various sequential orders of burnout symptoms (Makikangas et al., 2020), changes in work-family interfaces (i.e. work-family conflict and work-family enrichment) during COVID-19, predictors of changes in work-family interfaces (Vaziri et al., 2020), and the existence of additional subgroups over and above burnout’ and ‘engagement’ (Leiter & Maslach, 2016). The benefits of a person-centered approach in combination with the detailed, holistic findings that result from profile analysis serve as the support for why this study uses a profile approach instead of a traditional variable-centered approach.

As previously stated, the JD-R model consists of both job demands and job resources. In this model, it is predicted that high job demands are related to exhaustion, whereas limited job resources are related to disengagement. The simultaneous existence of exhaustion and disengagement resulting from high job demands and limited job resources is posited by Demerouti et al. (2001) to represent the *burnout syndrome*. Thus, the JD-R model has been used by some researchers to help explain the burnout phenomenon. Although limited in number, research has been conducted on clinician burnout from the perspective of the JD-R model.

A study on medical residents in Greece was consistent with the JD-R model as they found that both job resources and demands were related to burnout (Zis et al., 2014).

The demands and resources found to be most strongly related to burnout were time pressure, workload, professional development opportunities, and autonomy. Among a group of Canadian physicians, researchers discovered that workload and work-life conflict were strong predictors of emotional exhaustion and physiological stress symptoms, while autonomy and predictability had the opposite outcome (Lee et al., 2010). This research leads to the following overarching research question:

Research Question 1: What combinations of job demands and job resources make emergency medicine clinicians more or less susceptible to burnout during COVID-19?

Proposed Clinician Profiles of Burnout Antecedents

In order to identify predictors of burnout in clinicians working during COVID-19, I propose four clinician profiles. The contents of the profiles include general job demands, COVID-19-specific demands, and job resources. The profiles allow for a greater understanding on how certain variables interact to increase or decrease burnout risk. Additionally, if it is known what contributes to burnout, at-risk individuals can be identified before they burn out. Based on my review of the literature, I propose the following combinations (see *Figure 1* for the graphical representations of each profile):

High COVID-19-related job demands (CJD), high general job demands (GJD), and low job resources (JR): VHBR (very high burnout risk), Demand Overload. This profile aligns with the JD-R model of burnout such that high job demands and low job resources are associated with employee burnout. In addition to general job demands being high, COVID-19-related job demands are also high. In this scenario, there is an increase in job demands overall—particularly emotional demands—and therefore, the

risk of burnout should be higher and the association with burnout should be stronger in comparison to the other profiles. As previously mentioned, studies on clinicians have found support for the relationship between job demands, job resources, and burnout, thus providing empirical support for this profile (Lee et al., 2010; Zis et al., 2014; Viotti et al., 2015; Vander Elst et al., 2016).

High CJD, low GJD, and low JR: HBR, Situational Burnout. Even if general job demands are low, clinicians could still experience a high level of COVID-19-related demands. A lot of these demands (e.g., lack of proper PPE, fear of exposing family to the virus, fear of family and friends getting sick, supply shortages) are unique or exacerbated by the pandemic and thus, the resources and coping skills that clinicians already have and use may not be effective or applicable. The elements of this profile also follow the classic JD-R framework in which high demands and low resources are associated with burnout. Additionally, emotional demands—a category that a lot of the COVID-19 demands fall under—are particularly influential in the burnout process because emotional exhaustion plays such a large role (Vander Elst et al., 2016). This profile, therefore, represents clinicians who are at risk of burnout only because of COVID-19 job demands. In a non-pandemic context, they would have low demands and low resources, which would not put them at high risk of burnout.

Low CJD, moderate GJD, moderate JR: LBR (low burnout risk), Engaged and Satisfied. Unlike the profiles above, clinicians who fit in this profile have a balance of job demands and job resources and thus, have a lower risk of burnout. Research has shown the combination of moderate, or manageable, demands in conjunction with

appropriate and adequate resources is associated with higher levels of engagement and lower levels of burnout among employees. It is important to note that having some level of job demands is actually positive—as long as there are resources available—as they present as challenges which increase engagement levels (Bakker et al., 2007). This is precisely the reasoning for predicting that general job demands will be moderate rather than low.

Moderate CJD, moderate GJD, high JR: LBR, Made for Medicine. This profile represents individuals who are truly cut out to be clinicians.. While these individuals may face moderate to high demands at work, their sense of meaningful work along with other job resources buffer the negative effects of job stressors. Research has shown that meaningful work and other job resources such as co-worker and supervisor support are associated with lower levels of burnout (Shanafelt et al., 2009; Charoensukmongkol et al., 2016). This profile is distinct from the Engaged and Satisfied profile in that it contains a high level of job resources. Although the profiles compile the job resources instead of having them be parsed out, I expect high meaningful work among individuals who fit into this profile.

Other hybrid profiles

There is a chance that the Made for Medicine profile will have the exact opposite outcome of what is predicted. Individuals who care a lot about their patients and are emotionally invested in their job could see negative effects from the constant exposure of sick and dying COVID patients that are beyond help. In this situation, emotional exhaustion is a likely outcome. It is possible that either the job resources available are not

sufficient enough or applicable to stressors faced and therefore strain is still experienced and there is a higher risk of burnout. Profiles could also emerge that deviate slightly from the proposed combinations. For example, the level of demands in the last two profiles could differ slightly but have the same results, such as GJD being high instead of moderate.

Unlikely profiles

Although all sorts of combinations are possible, some are less likely than others. Due to the stressful nature of clinical work, which has been exacerbated in most causes by the pandemic, a profile made up of low CJD, GJD, and JR is not likely to occur. If this profile were to appear, however, it would be characterized by employees with a relatively low burnout risk who are quite indifferent and have low engagement levels. Additionally, considering burnout is the outcome variable that these profiles are predicting, combinations that contradict the JD-R model—the framework that was used to create the profiles—are unlikely. For example, it would be contradictory to pre-existing research if a profile emerged that contained high job demands and low resources but was associated with low levels of burnout.

One of the main goals of this study is to advance the research on clinician burnout and identify predictors of burnout. Knowing the predictors and profiles of individuals who are susceptible to burnout is important because it allows clinicians who are at a high-risk of burnout to be identified and therefore, efforts can be made to prevent the burnout before it happens. To help achieve this, I propose a second research question:

Research Question 2: Which of the proposed profiles predict burnout of emergency medicine clinicians during the COVID-19 pandemic?

CHAPTER FIVE

METHOD

Participants and procedure

The data for the study was collected from two iterations of a larger, ongoing survey of emergency medicine clinicians working at a health system in the southeastern United States with an overarching goal of helping Emergency Department (ED) leadership identify how to best support their clinicians during COVID-19. The original study proposed using data from only one iteration (July 2020). However, to test the strength of the profiles, data from another iteration (August 2020) was used to see if the profiles that emerged in July were predictive of the next month's burnout scores. The July 2020 survey data will be referred to as Survey 1 and the August 2020 survey data will be referred to as Survey 2 for the remainder of this paper.

To collect data, a brief online survey sent out each month via email gathered information on employee well-being, burnout, stressors, resources, and requested support during the COVID-19 pandemic. Initially, the survey limited participants to attending physicians, resident physicians, and APPs, as a quality improvement project initiated by ED physician leadership. However, due to interest and support from ED nursing leadership, registered nurses (RNs) were included in the survey starting with the third monthly iteration. The specific iteration that was chosen for this thesis was done so because nurses were included along with the original set of clinicians.

All participants who completed the survey received a \$5 gift card as compensation. A total of 224 clinicians completed Survey 1 and 123 clinicians completed

both Survey 1 and Survey 2. There were 135 nurses (60%), 58 attending physicians (26%), 17 APPs (8%), and 14 resident physicians (6%) who completed Survey 1. Out of the 224 participants who completed the survey at Time 1, 40 attendings (17.9%), 13 APPs (5.8%), 9 residents (4.0%), and 61 nurses (49.6%) also completed the survey at Time 2. An independent samples t-test was conducted to compare those who did not complete the second survey to those who completed both surveys. No significant mean differences were found between the two groups on measures taken at Time 1 (see Table 1). There are eight different sites represented in the sample, which include both urban and rural hospital emergency departments and urgent care centers. The majority of the participants work at the flagship location, which is the only location represented with a Level I Trauma Center.

Measures

All of the measures used in this study will be discussed in this section (see Appendices A-D for the full measures).

Burnout. *Burnout* was measured using a self-defined single item taken from the 10-question “Mini Z” instrument on burnout, stress, and work experience (Linzer et al., 2016). The overarching question posed by this item is, “Using your own definition of “burnout”, please circle one of the answers below”. There are five response options which range from “I enjoy work. I have no symptoms of burnout” on one end to “I feel completely burned out” on the opposite end. This instrument is validated and targeted to assess burnout in clinicians.

Job Demands. *Job demands* were measured using a check-all-that-apply list of job stressors created by a group of subject matter experts (SMEs) consisting of emergency medicine attending physicians and Industrial/Organizational (I/O) Psychology professionals with research experience in the healthcare industry. Participants were asked to choose the job demands that they had experienced in the last month. In this study, the measurement for job demands was calculated as the total number of job demands chosen divided by the number of job demands that were listed on the survey. Reporting the percent of total allows for easier understanding and interpretability as opposed to reporting the total number of job demands that each participant selected. The job demands were split into two categories—general job demands and COVID-19-related job demands—prior to the calculations.

COVID-19-related Job Demands. For this list of demands, emergency medicine physicians who worked the frontlines during COVID-19 were consulted, serving as SMEs. Research done on job demands during other pandemics (e.g., SARS, MERS, H1N1) as well as early research published on COVID-19 supports this list as there is much overlap (Wong et al., 2005; Ayanian, 2020). Examples of COVID-19 job demands include “Fear of my loved one getting sick and/or dying” and “Fear that the risk of COVID-19 is not under my control”.

General Clinician Job Demands. Research on job demands and healthcare-specific job demands as well as input from I/O psychologists who have conducted research on stress, well-being, and burnout in healthcare workers and attending physicians were used to compile a list of general job demands— not contingent upon

COVID-19—faced by emergency medicine clinicians. Examples of general job demands include “Too many bureaucratic tasks (e.g., charting, paperwork)” and “Staffing concerns in the ED (e.g., too few doctors, too few nurses, too few staff).

Job Resources. *Job resources* were also measured using a check-all-that-apply list created by the same group of SMEs that created the list of job demands. This list was informed by research and the expertise of emergency medicine attending physicians and I/O Psychology professionals. Participants were asked to choose the job resources that they had found helpful in the past month. Since some job resources were position-specific (e.g., nursing shift huddles, emails from ED nursing leadership, emails from EM leadership), the list and number of job resources that each participant saw varied slightly. For easier interpretability, job resources are reported as percent of total rather than the sum of all the job resources chosen by each participant, which was what I originally proposed. This was calculated by adding up the job resources that each participant selected as being helpful and dividing that by the number of job resources that were listed as answer choices on the survey.

Originally, I intended for job resources to be a single variable. However, when I ran the LPA for the first time, the results indicated a best-fitting model of two or three profiles. Thus, I split up the job resources and ran another LPA to see if more meaningful profiles would emerge. Since the model fit indices were stronger and more meaningful profiles were found ($N = 5$) when the job resources were split up into two categories, I decided to pivot and carry on the rest of my analyses with two naturally occurring categories of job resources, external job resources and meaningful work. Meaningful

work was used as opposed to a more all-encompassing category such as the idea for this specific study occurred after creating the survey items.

Meaningful Work. Research on meaningful work and input from I/O Psychology professionals and EM attending physicians were used to compile a list of internal job resources. Examples of internal job resource items include “Knowing that my work is meaningful” and “Having a positive impact on patients and their families”. The measure includes 3 items which were seen by every participant.

External Job Resources. For this study, external job resources refer to resources that are provided by the organization (external). Previous knowledge about job resources and input from I/O Psychology professionals and EM attending physicians were used to compile a list of external job resources. Examples of external job resource items include “Support from my coworkers on shift”, “Staff meetings” and “EM town halls”. In total, there are 11 job resource items, 9 of which were classified as external.

Analytic Procedures

JD-R profiles were generated using Latent Profile Analysis (LPA) in *Mplus* 8.4 (Muthen & Muthen, 2014). LPA is a person-centered approach that identifies unobserved homogeneous subgroups (latent profiles) by maximizing homogeneity within and heterogeneity between clustering subgroup variables (latent profile indicators). Four latent profile indicators were used in this thesis: COVID-19-related job demands, general job demands, internal job resources (person-centered), and external job resources (organization-centered).

The first step in the LPA was to determine the optimal number of profiles. I ran the LPA with a 2-profile specification at the start and subsequently increased the number of profiles until there was no improvement in model fit. Model fit indices, which include Bayesian information criterion (BIC; Schwartz, 1987), sample size adjusted BIC (aBIC; Sclove, 1987), and Entropy values were all used to assess fit. All indices were evaluated based on Nylund et al. (2007)'s criteria such that models with lower BIC and aBIC values indicate better fit and Entropy values, which assess the accuracy of each person's class assignment, are considered relatively strong at or above .70.

A bootstrap likelihood ratio test (BLRT; McLachlan, 1987) was used to compare k to $k-1$ number of profiles in which a value of $p < .05$ indicates that k number of profiles is a significantly better fit than the more restrictive $k-1$ model. The Lo-Mendell-Rubin (LMR) is another likelihood ratio test that was considered; however, Nylund et al. (2007) found its Type I error rate to be much higher (.25) than that of the BLRT (.05) at a sample size of 200, which is comparable to the sample size of this study ($n = 224$).

Mixture models, like the one in this study, are criticized for being susceptible to converging on local solutions instead of global solutions. To combat this, and following the recommendations of McLachlan and Peel (2000), a variety of random starts were tested until the maximum log likelihood value was observed and replicated. This method increases the confidence that the solution is a global, rather than local, maximum.

In order to address the second research question, the BCH method was used to explore the relationship between the latent variable observed in the LPA and burnout (distal outcome variable). Other possible methods include the 3-step approach (Vemunt,

2010) and Lanza et al.'s (2013) approach, however, they are more susceptible to profile shifts. A shift occurs when the latent variable is measured by the distal outcome variable instead of the latent profile indicators, thus rendering the results meaningless (Asparouhov & Muthen, 2014). As laid out by Asparouhov and Muthen (2014), the BCH method is preferred over the 3-step approach or Lanza et al.'s approach because it prevents profile shifts and performs well even when there is variance between classes on the distal outcome variable. Although not originally proposed, I also ran the BCH method with the burnout scores from Time 2. This was done to compare results from Time 1 and Time 2 see if the profiles that emerged from Time 1 were predictive of Time 2's burnout scores. Both BCH method analyses were conducted in *Mplus* 8.4 (Muthen & Muthen, 2014) and the optimal number of profiles identified in the first step were used for the analyses.

CHAPTER SIX

RESULTS

Descriptive Statistics and Correlations

Among the participants, 58 (26%) are attending physicians, 17 (8%) are APPs, 14 (6%) are resident physicians, and 135 (60%) were registered nurses. Over half of the participants worked at the flagship hospital site (55%) while the rest of the participants worked at one of the 6 other hospital sites. Descriptive statistics (i.e. means, standard deviations, ranges) are reported in Table 1. Participants reported slightly higher general job demands ($M = .34$, $SD = .22$) than COVID-19-related job demands ($M = .29$, $SD = .20$) and more internal job resources ($M = .49$, $SD = .39$) than external job resources ($M = .29$, $SD = .20$). For the one-item burnout measure, $M = 1.21$ and $SD = .77$.

The bivariate correlations for all variables, including the Time 2 burnout scores, are presented in Table 2. Time 1 burnout was significantly correlated with each of the variables, including Time 2 burnout ($p < .05$). Time 2 burnout was significantly correlated with every variable ($p < .05$) except external job resources ($p = .13$). Additionally, general job demands and COVID-19-related job demands had a significant bivariate correlation ($p < .01$). The largest bivariate correlation was between the Time 1 and Time 2 burnout scores ($r = .68$) followed by general job demands and COVID-19-related job demands ($r = .51$), Time 1 burnout and general job demands ($r = .46$), and Time 2 burnout and general job demands ($r = .42$). The rest of the significant bivariate correlations range from $r = -.30$ to $r = .38$.

Latent Profile Analysis

I tested 2, 3, 4, 5, and 6-profile solutions and used the following indices, which are standard for evaluating LPAs (Nylund et al., 2007), to determine the best fitting model: BIC, aBIC entropy values, and BLRTs (see Table 2). AIC (Akaike information criterion) results were not reported as Nylund and colleagues (2007) found that BIC was a better performing indicator and thus, AIC was not used to determine the best fitting profile solution. The BIC value decreased—an indication of better fit—as the number of profiles increased, but tapered out starting with the 4-profile solution. The aBIC, however, decreased with each added profile. Additionally, the BLRT was significant for all profile solutions ($p < .05$); however, for the 2-5 profile solutions, $p < .001$, while $p = .004$ for the 6-profile solution. Although the 6-profile was still significant, the increase in p -value indicates that the fit started to get weaker with the addition of the 6th profile, which is also shown by the decrease in entropy value compared to the 5-profile solution. Entropy values indicate the quality of profile assignment. Entropy is considered acceptable at .70 or higher and values closer to 1 indicate greater profile assignment accuracy. With the exception of the 2-profile model (*Entropy* = .93), the 5-profile solution had the highest entropy value (.88). Based on these indices, I determined that the 5-profile solution was the best fitting model.

Mean values of the latent profile indicators and distal outcome variable were used to name each profile solution, which are as follows: **Meaningful Work - Low Job Demands, Autopilot, Burnout Risk, Sufficient Resources, and Meaningful Work - High Job Demands. Meaningful Work - Low Job Demands (MW-LJD)** accounted for 78 participants (35% of the sample) and was characterized by moderate levels of both

general and COVID-19-related job demands, moderate external JR, and high internal JR. This profile is very similar to the Engaged and Satisfied profile that was originally proposed. Overall, both profiles had moderate demands and high resources. Additionally, the general demands were higher than the COVID-19-related demands in both profiles. Although the resources are similar between profiles, it is hard to draw a comparison as the proposed profiles contained one overall variable for job resources, and the actual analysis broke job resources up into two categories—internal and external.

Meaningful Work: High Job Demands (MW-HJD) accounted for 23 participants (10% of the sample). The MW-HJD and MW-LJD profiles both had high internal resources and moderate external resources, however, both its general and COVID-19-related job demands were approximately double that of MW-LJD, which is reflected in the name distinction between the two profiles. The MW-HJD profile parallels the proposed Made for Medicine profile in that demands are high and meaningful work/internal resources are also high. The main difference between the proposed profile and the profile that emerged is the relationship to burnout. This difference will be discussed in the next subsection.

Autopilot accounted for 71 participants (32% of the sample) and was characterized by low levels of both job resources and COVID-19-related job demands and a moderate level of general job demands. This profile is not similar to any of those that were proposed. In fact, I predicted that a profile with low demands and low resources would be unlikely to emerge due to the stressful nature of being an emergency medicine clinician, especially during COVID-19.

Burnout Risk accounted for 43 participants (19% of the sample) and was characterized by high general and COVID-19-related job demands, very low internal JR, and moderate external job resources. This profile is essentially the same as the Demand Overload profile with less extreme levels of job demands. Both profiles are representative of the JD-R model of burnout in which a combination of high job demands and low resources leads to an increased risk of burnout.

Opposite of the Burnout Risk profile is **Sufficient Resources**, which accounts for 9 participants (4% of the sample) and was characterized by moderate general job and COVID-19 related demands and high internal and external JR. This profile is also similar to the Engaged and Satisfied profile; however, the resources are higher for Sufficient Resources. Even though there were only 9 individuals from the sample who fit this profile, the classification probability for the most likely latent profile membership is 0.925, which is relatively strong. The probabilities for each profile can be found on Table 3.

Prediction of Burnout

The results of the BCH method, which include means and standard errors for each profiles' burnout scores and chi-square test statistics, can be found on Tables 4-5b. The mean burnout scores ranged from .72 to 1.71 and the overall chi-square test was significant $X^2(4, 224) = 36.02, p < .001$, which indicates that there are significant differences in burnout scores between profiles. However, not all of the burnout scores differed significantly between profiles. There were significant differences for the following: Burnout Risk had significantly higher burnout scores compared to MW-LJD

($p < .001$), Autopilot ($p < .001$), and Sufficient Resources ($p < .001$) and MW-HJD had significantly higher burnout scores compared to MW-LJD ($p = .026$), which was contrary to expectations, and Sufficient Resources ($p = .019$).

Since this survey was repeated monthly, I decided to test the strength of the profiles by using the same latent profile indices from Time 1 to estimate burnout scores from Time 2. The sample for this analysis was much lower ($N = 123$) due to the fact that not everyone who filled out Time 1 filled out Time 2 and vice versa. Despite the reduction in sample size, the BCH method resulted in a significant overall chi-square test $X^2(4, 123) = 22.68, p < .001$. However, likely due to the sample size, only three pairs of profiles had significantly different mean burnout scores. The mean burnout score for Burnout Risk, which was the highest among all profiles, was significantly higher than the mean burnout scores of MW-LJD ($p < .001$), Autopilot ($p = .001$), and Sufficient Resources ($p = .001$).

CHAPTER SEVEN

DISCUSSION

Burnout is a very pressing issue in the medical community that is quickly gaining attention around the world, particularly due to the COVID-19 pandemic, which has drastically increased the emotional and physical stressors that healthcare workers face. Due to the concern of increased burnout in healthcare workers paired with the devastating effects of burnout, the goal of this study was to identify what job resources and demands are more or less likely to result in emergency medicine clinician burnout. The profile approach that this thesis takes allows for a more in-depth understanding of burnout antecedents, as it can relay what factors impact burnout and to what degree as well as what combinations of job resources and job demands exist among clinicians.

This study proposed two research questions, both of which were able to be answered. The first research question—*What combination of job demands and job resources exist among emergency medicine clinicians during COVID-19*—was answered by the discovery of profiles and their respective burnout scores. From the analyses, it can be gathered that the Burnout Risk, Autopilot, and MW-HJD profiles are more susceptible to burnout. The two patterns of job demand and job resource combinations that make EM clinicians more susceptible to burnout are as follows: low to moderate levels of job resources that cannot make up for the negative impacts that result from high levels of COVID-19-related and general job demands and the absence of high levels of both external job resources and meaningful work, regardless of job demand levels. The key combination of job demands and job resources that make EM clinicians less susceptible

to burnout during COVID-19 is a moderate level of job demands paired with high levels of both internal and external job resources. The second research question was as follows: *Which of the proposed profiles predict burnout of emergency medicine clinicians during the COVID-19 pandemic?* The overall model resulted in a significant chi-square value, which indicates that the profiles are predictive of burnout. However, significant differences in mean burnout scores only occurred between specific profiles (see Table 5a and 5b).

Due to the lack of latent JD-R profile research, this study adds to the existing literature on and clinical knowledge of burnout. The remainder of this section will discuss what specific knowledge this study adds to the existing literature, how this information can be used to inform clinical decisions and interventions, and study limitations.

Theoretical Implications

The proposed profiles all differ at least slightly from those that emerged from the LPA due to the adjustment of latent profile indicators. An LPA was run with the initial three latent profile indicator model and the results suggested that a 2- or 3-profile solution was optimal. After splitting the job resources into two categories—internal and external job resources—more meaningfully distinct profiles emerged, thus leading to a change in the latent profile indicators. In addition to a better fitting model, the subsets of job resources provide more detail and understanding compared to having a catch-all job resources variable. Despite the adjustment in latent profile indicators, three of the profiles that emerged in the LPA (Burnout Risk, Sufficient Resources, MW-HJD) are consistent

with profiles that were proposed (Demand Overload, Engaged and Satisfied, Made for Medicine).

The Burnout Risk profile, which is essentially the same as the proposed Demand Overload profile, parallels the JD-R model of burnout in which job demands are high and job resources are low. Opposite of Burnout Risk is the Sufficient Resources profile—consistent with the proposed Engaged and Satisfied profile—which is characterized by high levels of job resources and low/moderate levels of job demands. The emergence of these profiles is relatively unsurprising as the low to moderate demands/high resources and high demands/low resources dichotomies are often discussed in the JD-R and burnout literatures (Demerouti, 2001; Schaufeli & Bakker, 2004). However, the other 3 profiles are more novel and further the theoretical understanding of job demands and resources, particularly in the clinical environment.

The Autopilot profile has relatively low levels of all latent profile indicators—general job demands are slightly higher than the rest of the indicators—which is a combination that I predicted would be unlikely to emerge. Even more surprising is that it's the second most populous profile at 31% of the sample. It is possible that the clinicians who fall into this profile truly do not have many job demands or resources. However, it is also possible that this profile represents clinicians who have already burned out and either were unaware or unwilling to disclose their burnout status on the survey.

The remaining two profiles—MW-LJD and MW-HJD—both have high internal job resources and low to moderate external job resources, but MW-HJD has

approximately twice the level of both job demands compared to MW-LJD. The MW-HJD is consistent with the proposed Made for Medicine profile, however, as will be discussed in the next subsection, its relationship to burnout is different from what was predicted. These profiles are theoretically interesting because they show the differences between and patterns among different types of job resources. For example, none of the profiles have high external job resources and low internal job resources, however, the opposite is true in two of the profiles. This observation could just be a coincidence with no meaningful reason behind it, but it is also possible that individuals who do not perceive their work as meaningful may not be aware of or view organizational resources as helpful. Insights such as the one just mentioned emphasize the level of detail that comes from LPAs, which further the theoretical understanding and can spark additional questions that can manifest into research studies.

After the 5-profile solution was discovered, another analysis was run to evaluate the relationship between the profiles and burnout, which was the primary goal of this study. Consistent with the JD-R model of burnout, the “best” profile had high levels of both types of job resources and moderate levels of both types of job demands, whereas the “worst” profile had low levels of both job resources and high levels of both job demands. The second highest burnout score belongs to the MW-HJD profile, which is opposite of what I predicted. My rationale for the prediction was that meaningful work would serve as a strong buffer to moderate or even high demands that an employee is experiencing, thus resulting in a lower burnout score. Based on the results of the BCH method, it is apparent that either both internal and external resources must be high in

order to have a lower burnout score or once the demands surpass a certain point, the burnout score is likely to be high regardless of the number of resources.

The MW-HJD profile also had a significantly higher burnout score than the Sufficient Resources profile. Since the demands in the MW-HJD profile are higher than those in the Sufficient Resources profile it is not an exact comparison, however, the level of external job resources between the two profiles is quite different. Taking the profile elements and burnout scores into consideration, it is probable that a combination of both high internal and external resources is necessary for lower burnout scores.

Although the same analysis using the next month's burnout resulted in fewer significant paired comparisons, the mean burnout scores of the Burnout Risk profile were still significantly different from three of the other profiles. The results of both analyses suggest that those who have high levels of job demands, low external job resources, and either non-existent or very low levels of internal resources are at a high risk of burning out. Overall, this thesis provides increased theoretical support for the JD-R model of burnout and evidence that suggests studying subsets of job demands and resources in order to further understand what precedes burnout in emergency medicine clinicians.

Clinical Implications

The findings of this thesis are important to the clinical realm because they can help inform both preventative and reactive burnout interventions. Using the 5-profile solution, hospital leadership could identify individuals who are at a high risk of burnout before they actually burn out. This strategy would likely increase the well-being of employees as well as save the healthcare organization a lot of time and money.

Additionally, the profiles could be used to create personalized intervention strategies. Based on the profile of an individual who is either at risk of burnout or already burning out, a personalized intervention strategy could be put in place to realign their ratio of job demands and job resources. For example, an intervention for individuals who fit into the autopilot profile would focus on increasing both internal and external job resources since the perceived demands are relatively low. The detailed nature of profiles allows for more efficient and accurate interventions as opposed to a trial-and-error or one-size-fits-all approach.

Not only are these research findings helpful for hospital leadership, but also clinicians themselves. If clinicians are made aware of what is more likely to lead to burnout, preventative action can be taken so that their risk of burnout is reduced. Furthermore, if clinicians were made aware of the profiles and their relationship to burnout, they may be able to identify peers or co-workers who are at risk of burning out. In some organizations, confrontation by a peer may be preferred over a superior and could increase the likelihood of seeking help, particularly in a working environment that is not psychologically safe.

Limitations

Although the sample size for this study exceeded 200, which was tested and found to be acceptable barring the use of specific analyses and indices (Nylund et al., 2007), the sample is small enough to warrant some concerns. Small sample sizes are more likely to have range restriction and reduced variability between participants which can cloud the outcomes of an LPA. If the sample size were larger, it is possible that the emerged

profiles would differ from what was found in this study. Sample size was even more of an issue for the second BCH method analysis in which the relationship between the confirmed profiles and the burnout scores from Time 2 was tested. Since not everyone who responded to the survey at Time 1 responded to survey at Time 2 and vice versa, the sample size for the Time 2 burnout analysis was 101 less than the analysis using Time 1 burnout scores. The reduction in sample size is likely what led to the reduction in significant paired comparisons of mean burnout scores between profiles.

The use of a single institution sample is also a limitation. Participants were pulled from one geographic location— southeastern United States—and one health system, which could impact the generalizability and representativeness of the findings. It is also possible that individuals who were close to burning out or already burned out would be less likely to take the survey, therefore skewing the results due to range restriction.

Lastly, this study primarily focused on data from a single iteration of a survey. While an analysis was conducted on burnout scores from two consecutive months, the sample size for secondary analysis was likely too small to take the LPA results at face value. Additionally, it is likely that only running one additional analysis using distal outcome data from the survey one month later is not enough. In the next section, I will present future research ideas that combat the limitations discussed.

Future Research

Since the profile approach is still in its infancy compared to other data analysis methods, the future research opportunities are plentiful. To better the methodology and overall strength of this thesis, studies with larger and more representative samples should

be conducted. Furthermore, to reduce range restriction and expand upon what is known about clinician burnout, different specialties should be represented. Medscape releases a report each year of burnout rates by specialty. This could be useful for making sure that high-burnout, average-burnout, and low-burnout specialties are included in the sample, which could lessen the chance of range restriction for burnout scores.

Due to the overwhelming number of cross-sectional designs in the burnout literature, there is a strong need for longitudinal research. To more accurately capture burnout and its antecedents, data should be gathered 1 month, 3 months, and 6 months after the original data collection. This approach will capture possible profile shifts and provide a better understanding of the relationship between confirmed profiles and burnout scores. Lastly, to increase validity, future research should include a full measure of burnout rather than an abbreviated measure.

Conclusion

The purpose of this study was to identify antecedents that make EM clinicians more or less susceptible to burnout in hopes that the information could be used to identify individuals who are at risk of burnout and inform interventions for those who are both on the path to burnout or are already burned out. The results revealed that high levels of job demands are likely to increase the likelihood of burnout. The likelihood of burnout is highest when job demands are high and resources are low, but there is still an increased likelihood of burnout when only one type of resource is high as opposed to both types. These findings add a detailed understanding of how burnout can manifest in clinicians--which is likely transferable to other professions--and shows how LPA can be used to

better understand burnout. Clinician leadership can use this information to inform policies and interventions that will prevent and treat burnout, which will ultimately better the health of both employees and healthcare organizations.

REFERENCES

- Adams, J. G., & Walls, R. M. (2020). Supporting the health care workforce during the COVID-19 global epidemic. *JAMA*, 323(15), 1439-1440.
- Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, 79(2), 549-562.
- Alarcon, G., Eschleman, K. J., & Bowling, N. A. (2009). Relationships between personality variables and burnout: A meta-analysis. *Work & Stress*, 23(3), 244-263.
- Arora, M., Asha, S., Chinnappa, J., & Diwan, A. D. (2013). Burnout in emergency medicine physicians. *Emergency Medicine Australasia*, 25(6), 491-495.
- Ayanian, J. Z. (2020, April). Mental health needs of health care workers providing frontline COVID-19 care. *JAMA Health Forum*, 1(4).
- Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, 10(2), 170.
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*.
- Barello, S., Palamenghi, L., & Graffigna, G. (2020). Burnout and somatic symptoms among frontline healthcare professionals at the peak of the Italian COVID-19 pandemic. *Psychiatry Research*, 290, 113129.
- Beehr, T. A., & McGrath, J. E. (1992). Social support, occupational stress and anxiety. *Anxiety, Stress, and Coping*, 5(1), 7-19.

- Bøggild, H., & Knutsson, A. (1999). Shift work, risk factors and cardiovascular disease. *Scandinavian Journal of Work, Environment & Health*, 85-99.
- Boutou, A., Pitsiou, G., Sourla, E., & Kioumis, I. (2019). Burnout syndrome among emergency medicine physicians: an update on its prevalence and risk factors. *Eur Rev Med Pharmacol Sci*, 23(20), 9058-9065
- Bragard, I., Dupuis, G., & Fleet, R. (2015). Quality of work life, burnout, and stress in emergency department physicians: a qualitative review. *European Journal of Emergency Medicine*, 22(4), 227-234.
- Bunderson, J. S., & Thompson, J. A. (2009). The call of the wild: Zookeepers, callings and the dual edges of deeply meaningful work. *Administrative Science Quarterly*, 54(1), 32–57.
- Buunk, B. P. (1990). Affiliation and helping interactions within organizations: A critical analysis of the role of social support with regard to occupational stress. *European Review of Social Psychology*, 1(1), 293-322.
- Cai, H., Tu, B., Ma, J., Chen, L., Fu, L., Jiang, Y., & Zhuang, Q. (2020). Psychological Impact and Coping Strategies of Frontline Medical Staff in Hunan Between January and March 2020 During the Outbreak of Coronavirus Disease 2019 (COVID-19) in Hubei, China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 26.
- Callahan, K., Christman, G., & Maltby, L. (2018) Battling burnout: strategies for promoting physician wellness. *Advances in Pediatrics*, 65, 1–17.

- Caplan, R. D., Cobb, S., & French, J. R. (1975). Relationships of cessation of smoking with job stress, personality, and social support. *Journal of Applied Psychology*, 60(2), 211.
- Charoensukmongkol, P., Moqbel, M., Gutierrez-Wirsching, S., & Shankar, R. (2016). The role of coworker and supervisor support on job burnout and job satisfaction. *Journal of Advances in Management Research*.
- Chung, S., Dillon, E. C., Meehan, A. E., Nordgren, R., & Frosch, D. L. (2020). The Relationship Between Primary Care Physician Burnout and Patient-Reported Care Experiences: a Cross-sectional Study. *Journal of General Internal Medicine*, 1-8.
- Cohn, K. H., Bruce Bethancourt, M. D., & Simington, M. (2009). The lifelong iterative process of physician retention. *Journal of Healthcare Management*, 54(4), 220.
- Costa, G. (2003). Shift work and occupational medicine: an overview. *Occupational Medicine*, 53(2), 83-88.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology*, 86(3), 499-512.
- Dempsey, C., & Reilly, B. (2016). Nurse engagement: What are the contributing factors for success. *OJIN: The Online Journal of Issues in Nursing*, 21(1).
- Dewa, C. S., Loong, D., Bonato, S., Trojanowski, L., & Rea, M. (2017). The relationship between resident burnout and safety-related and acceptability-related quality of healthcare: a systematic literature review. *BMC Medical Education*, 17(1), 195.

- Dillon, E. C., Tai-Seale, M., Meehan, A., Martin, V., Nordgren, R., Lee, T., Nauenberg, & Frosch, D. L. (2020). Frontline perspectives on physician burnout and strategies to improve well-being: Interviews with physicians and health system leaders. *Journal of General Internal Medicine*, 35(1), 261-267.
- Dobler, C. C., West, C. P., & Montori, V. M. (2017). Can shared decision making improve physician well-being and reduce burnout?. *Cureus*, 9(8).
- Dzau, V. J., Kirch, D. G., & Nasca, T. J. (2018). To care is human—collectively confronting the clinician-burnout crisis. *N Engl J Med*, 378(4), 312-314.
- Edwards, S. T., Marino, M., Balasubramanian, B. A., Solberg, L. I., Valenzuela, S., Springer, R., ... & Ono, S. (2018). Burnout among physicians, advanced practice clinicians and staff in smaller primary care practices. *Journal of General Internal Medicine*, 33(12), 2138-2146.
- Escribà-Agüir, V., Martín-Baena, D., & Pérez-Hoyos, S. (2006). Psychosocial work environment and burnout among emergency medical and nursing staff. *International Archives of Occupational and Environmental Health*, 80(2), 127-133.
- Flowerdew, L., Brown, R., Russ, S., Vincent, C., & Woloshynowych, M. (2012). Teams under pressure in the emergency department: an interview study. *Emergency Medicine Journal*, 29(12).
- García-Herrero, S., Mariscal, M. A., Gutiérrez, J. M., & Ritzel, D. O. (2013). Using Bayesian networks to analyze occupational stress caused by work demands:

- Preventing stress through social support. *Accident Analysis & Prevention*, 57, 114-123.
- Garrosa, E., Rainho, C., Moreno-Jimenez, B., & Monteiro, M. J. (2010). The relationship between job stressors, hardy personality, coping resources and burnout in a sample of nurses: A correlational study at two time points. *International Journal of Nursing Studies*, 47(2), 205-215.
- Gevers, J., Van Erven, P., De Jonge, J., Maas, M., & De Jong, J. (2010). Effect of acute and chronic job demands on effective individual teamwork behaviour in medical emergencies. *Journal of Advanced Nursing*, 66(7), 1573-1583.
- Gold, D. R., Rogacz, S., Bock, N., Tosteson, T. D., Baum, T. M., Speizer, F. E., & Czeisler, C. A. (1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health*, 82(7), 1011-1014.
- Hannah, S. T., Uhl-Bien, M., Avolio, B. J., & Cavarretta, F. L. (2009). A framework for examining leadership in extreme contexts. *The Leadership Quarterly*, 20(6), 897-919.
- Halcomb, E., Williams, A., Ashley, C., McInnes, S., Stephen, C., Calma, K., & James, S. (2020). The support needs of Australian primary health care nurses during the COVID-19 pandemic. *Journal of Nursing Management*, 28(7), 1553-1560.
- Harrison, E. M., Walbeek, T. J., Maggio, D. G., Herring, A. A., & Gorman, M. R. (2020). Circadian profile of an emergency medicine department: scheduling practices and

- their effects on sleep and performance. *The Journal of Emergency Medicine*, 58(1), 130-140.
- Hoot, N. R., & Aronsky, D. (2008). Systematic review of emergency department crowding: causes, effects, and solutions. *Annals of Emergency Medicine*, 52(2), 126-136.
- Hyman, S. A., Shotwell, M. S., Michaels, D. R., Han, X., Card, E. B., Morse, J. L., & Weinger, M. B. (2017). A survey evaluating burnout, health status, depression, reported alcohol and substance use, and social support of anesthesiologists. *Anesthesia & Analgesia*, 125(6), 2009-2018.
- Ilic, M., Todorovic, Z., Jovanovic, M., & Ilic, I. (2017). Burnout syndrome among medical students at one university in Serbia: Validity and reliability of the maslach burnout inventory—Student survey. *Behavioral Medicine*, 43(4), 323-328.
- Jenkins, R., & Elliott, P. (2004). Stressors, burnout and social support: nurses in acute mental health settings. *Journal of Advanced Nursing*, 48(6), 622-631.
- Kroth, P. J., Morioka-Douglas, N., Veres, S., Babbott, S., Poplau, S., Qeadan, F., Parshall, C., Corrigan, & Linzer, M. (2019). Association of electronic health record design and use factors with clinician stress and burnout. *JAMA Network Open*, 2(8).
- Labrague, L. J., & De los Santos, J. A. A. (2020). COVID-19 anxiety among front-line nurses: Predictive role of organisational support, personal resilience and social support. *Journal of Nursing Management*, 28(7), 1653-1661.

- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, 3(3).
- LaRocco, J. M., House, J. S., & French Jr, J. R. (1980). Social support, occupational stress, and health. *Journal of Health and Social Behavior*, 202-218.
- Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, 81(2), 123.
- Lee, Y. Y., & Lin, J. L. (2010). Do patient autonomy preferences matter? Linking patient-centered care to patient–physician relationships and health outcomes. *Social Science & Medicine*, 71(10), 1811-1818.
- Leiter, M. P., & Maslach, C. (2016). Latent burnout profiles: A new approach to understanding the burnout experience. *Burnout Research*, 3(4), 89-100.
- Li, F., Jiang, L., Yao, X., & Li, Y. (2013). Job demands, job resources and safety outcomes: The roles of emotional exhaustion and safety compliance. *Accident Analysis & Prevention*, 51, 243-251.
- Linzer, M., Poplau, S., Babbott, S., Collins, T., Guzman-Corrales, L., Menk, J., Murphy, M. L., & Ovington, K. (2016). Worklife and wellness in academic general internal medicine: results from a national survey. *Journal of general internal medicine*, 31(9), 1004-1010.
- Lips-Wiersma, M., & Morris, L. (2009). Discriminating between ‘meaningful work’ and the ‘management of meaning’. *Journal of Business Ethics*, 88(3), 491-511.

- Luther, L., Gearhart, T., Fukui, S., Morse, G., Rollins, A. L., & Salyers, M. P. (2017). Working overtime in community mental health: Associations with clinician burnout and perceived quality of care. *Psychiatric Rehabilitation Journal*, 40(2), 252.
- Mahat, G. (1998, March). Stress and coping: junior baccalaureate nursing students in clinical settings. In *Nursing Forum* (Vol. 33, No. 1, pp. 11-19). Oxford, UK: Blackwell Publishing Ltd.
- Mäkikangas, A., Leiter, M. P., Kinnunen, U., & Feldt, T. (2020). Profiling development of burnout over eight years: relation with job demands and resources. *European Journal of Work and Organizational Psychology*, 1-12.
<https://doi.org/10.1080/1359432X.2020.1790651>
- Mammadov, S., Ward, T. J., Cross, J. R., & Cross, T. L. (2016). Use of latent profile analysis in studies of gifted students. *Roeper Review*, 38(3), 175-184.
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, 2(2), 99-113.
- Maslach, C. (1993). *Burnout: A multidimensional perspective*. In W. B. Schaufeli, C. Maslach, & T. Marek (Eds.), *Series in applied psychology: Social issues and questions. Professional burnout: Recent developments in theory and research* (p. 19–32). Taylor & Francis.
- Mason, D. J., & Friese, C. R. (2020). Protecting health care workers against COVID-19—and being prepared for future pandemics. *JAMA Health Forum*, 1(3).

- McCusker, J., Vadeboncoeur, A., Lévesque, J. F., Ciampi, A., & Belzile, E. (2014). Increases in emergency department occupancy are associated with adverse 30-day outcomes. *Academic Emergency Medicine*, 21(10), 1092-1100.
- McHugh, M. D., Kutney-Lee, A., Cimiotti, J. P., Sloane, D. M., & Aiken, L. H. (2011). Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Affairs*, 30(2), 202-210.
- Meyer, J. P., & Morin, A. J. (2016). A person-centered approach to commitment research: Theory, research, and methodology. *Journal of Organizational Behavior*, 37(4), 584-612.
- Mills, L. D., & Mills, T. J. (2005). Symptoms of post-traumatic stress disorder among emergency medicine residents. *The Journal of Emergency Medicine*, 28(1), 1-4.
- Muthén, L.K. and Muthén, B.O. (1998-2017). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.
- National Academies of Sciences, Engineering, and Medicine. (2019). *Taking action against clinician burnout: A systems approach to professional well-being*. The National Academies Press. <https://doi.org/10.17226/25521>
- Nembhard, I. M., & Edmondson, A. C. (2006). Making it safe: The effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 27(7), 941-966.

- Nguyen, L. H., Drew, D. A., Graham, M. S., Joshi, A. D., Guo, C. G., Ma, W., Mehta, R. S., Warner, E. T., Sikavi, D. R., Lo, C., Kwon, S., Mingyang, S., Mucci, L. A., Stampfer, M. J., Willett, W. C., Eliassen, A. H., Hart, J. E., Chavarro, J. E., Rich-Edwards, J. W., Davies, R., Capdevila, J., Lee, K. A., Lochlainn, M. N., Varsavsky, T., Sudre, C. H., Cardoso, M. J., Wolf, J., Spector, T. D., Ourselin, S., Steves, C. J., & Chan, A. T.. (2020). Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *The Lancet Public Health*, 5(9), 475-483.
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(4), 535-569.
- Orgambídez-Ramos, A., & de Almeida, H. (2017). Work engagement, social support, and job satisfaction in Portuguese nursing staff: A winning combination. *Applied Nursing Research*, 36, 37-41.
- Osipow, S. H., Doty, R. E., & Spokane, A. R. (1985). Occupational stress, strain, and coping across the life span. *Journal of Vocational Behavior*, 27(1), 98-108.
- Pavlish, C., & Hunt, R. (2012). An exploratory study about meaningful work in acute care nursing. *Nursing Forum*, 47(2), 113-122.
- Potter, G. D., Skene, D. J., Arendt, J., Cade, J. E., Grant, P. J., & Hardie, L. J. (2016). Circadian rhythm and sleep disruption: causes, metabolic consequences, and countermeasures. *Endocrine Reviews*, 37(6), 584-608.

- Ramanujam, R., Abrahamson, K., & Anderson, J. G. (2008). Influence of workplace demands on nurses' perception of patient safety. *Nursing & Health Sciences*, 10(2), 144-150.
- Rosso, B. D., Dekas, K. H., & Wrzesniewski, A. (2010). On the meaning of work: A theoretical integration and review. *Research in Organizational Behavior*, 30, 91-127.
- Santarone, K., McKenney, M., & Elkbuli, A. (2020). Preserving mental health and resilience in frontline healthcare workers during COVID-19. *The American Journal of Emergency Medicine*.
- Saijo, Y., Yoshioka, E., Hanley, S. J., Kitaoka, K., & Yoshida, T. (2018). Job stress factors affect workplace resignation and burnout among Japanese rural physicians. *The Tohoku Journal of Experimental Medicine*, 245(3), 167-177.
- Schaufeli, W. B. (2017). Applying the job demands-resources model. *Organizational Dynamics*, 2(46), 120-132.
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 25(3), 293-315.
- Schrijver, I., Brady, K. J., & Trockel, M. (2016). An exploration of key issues and potential solutions that impact physician wellbeing and professional fulfillment at an academic center. *PeerJ*, 4(1783).

- Serrano-Ripoll, M. J., Meneses-Echavez, J. F., Ricci-Cabello, I., Fraile-Navarro, D., Fiol-deRoque, M. A., Moreno, G. P., Castro, A., Ruiz-Perez, I., Zamanillo Campos, R., & Gonçalves-Bradley, D. (2020). Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review and meta-analysis. *Journal of Affective Disorders*.
- Sfantou, D. F., Laliotis, A., Patelarou, A. E., Sifaki-Pistolla, D., Matalliotakis, M., & Patelarou, E. (2017). Importance of leadership style towards quality of care measures in healthcare settings: a systematic review. In *Healthcare*, 5(4), 73.
- Shanafelt, T. D., West, C. P., Sloan, J. A., Novotny, P. J., Poland, G. A., Menaker, R., Rummans, T. A., & Dyrbye, L. N. (2009). Career fit and burnout among academic faculty. *Archives of Internal Medicine*, 169(10), 990-995.
- Shanafelt, T., Goh, J., & Sinsky, C. (2017). The business case for investing in physician well-being. *JAMA Internal Medicine*, 177(12), 1826-1832.
- Shechter, A., Diaz, F., Moise, N., Anstey, D. E., Ye, S., Agarwal, S., Birk, J. L., Brodie, D., Canoe, D. E., Chang, B., Classen, J., Cornelius, T., Derby, L., Dong, M., Givens, R. C., Hochman, B., Homma, S., Kronish, I. M., Lee, S. A. J., Manzano, W., Mayer, L. E. S., McMurry, C. L., Moitra, V., Pham, P., Rabbani, L., Rivera, R. R., Schwartz, A., Schwartz, J. E., Shapiro, P. A., Shaw, K., Sullivan, A. M., Vose, C., Wasson, L., Edmondson, D., & Abdalla, M. (2020). Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *General Hospital Psychiatry*, 66, 1-8.

- Smith-Coggins, R., Rosekind, M. R., Hurd, S., & Buccino, K. R. (1994). Relationship of day versus night sleep to physician performance and mood. *Annals of Emergency Medicine*, 24(5), 928-934.
- Somville, F. J., De Gucht, V., & Maes, S. (2016). The impact of occupational hazards and traumatic events among Belgian emergency physicians. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 24(1), 59.
- Steger, M. F., & Dik, B. J. (2009). If one is looking for meaning in life, does it help to find meaning in work?. *Applied Psychology: Health and Well-Being*, 1(3), 303-320.
- Stenson, B. A., Anderson, J. S., & Davis, S. R. (2020). Staffing and Provider Productivity in the Emergency Department. *Emergency Medicine Clinics*, 38(3), 589-605.
- Swensen, S., Strongwater, S., & Mohta, N. S. (2018). Leadership survey: immunization against burnout. *NEJM Catalyst*, 4(2).
- Swider, B. W., & Zimmerman, R. D. (2010). Born to burnout: A meta-analytic path model of personality, job burnout, and work outcomes. *Journal of Vocational Behavior*, 76(3), 487-506.
- Van Bogaert, P., Timmermans, O., Weeks, S. M., van Heusden, D., Wouters, K., & Franck, E. (2014). Nursing unit teams matter: Impact of unit-level nurse practice environment, nurse work characteristics, and burnout on nurse reported job outcomes, and quality of care, and patient adverse events—A cross-sectional survey. *International Journal of Nursing Studies*, 51(8), 1123-1134.

- Vander Elst, T., Cavents, C., Daneels, K., Johannik, K., Baillien, E., Van den Broeck, A., & Godderis, L. (2016). Job demands–resources predicting burnout and work engagement among Belgian home health care nurses: A cross-sectional study. *Nursing outlook*, 64(6), 542-556.
- van der Heijden, B. I., Demerouti, E., Bakker, A. B., & Hasselhorn, H. (2008). Work-home interference among nurses: Reciprocal relationships with job demands and health. *Journal of Advanced Nursing*, 62(5), 572-584.
- Velando-Soriano, A., Ortega-Campos, E., Gómez-Urquiza, J. L., Ramírez-Baena, L., De La Fuente, E. I., & Cañadas-De La Fuente, G. A. (2020). Impact of social support in preventing burnout syndrome in nurses: A systematic review. *Japan Journal of Nursing Science*, 17(12269).
- Viotti, S., Gilardi, S., Guglielmetti, C., & Converso, D. (2015). Verbal aggression from care recipients as a risk factor among nursing staff: a study on burnout in the JD-R model perspective. *BioMed research international*, 2015.
- Wallace, J. E., & Lemaire, J. (2007). On physician well being—you'll get by with a little help from your friends. *Social Science & Medicine*, 64(12), 2565-2577.
- Watson, A. G., McCoy, J. V., Mathew, J., Gundersen, D. A., & Eisenstein, R. M. (2019). Impact of physician workload on burnout in the emergency department. *Psychology, Health & Medicine*, 24(4), 414-428.
- Webber, S., Babal, J. C., Shadman, K. A., Collier, R. J., & Moreno, M. A. (2020). Exploring academic pediatrician perspectives of factors impacting physician well-being. *Academic Pediatrics*, 20(6), 833-839.

- West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: contributors, consequences and solutions. *Journal of Internal Medicine*, 283(6), 516-529.
- Wilson, J. M., Lee, J., Fitzgerald, H. N., Oosterhoff, B., Sevi, B., & Shook, N. J. (2020). Job insecurity and financial concern during the COVID-19 pandemic are associated with worse mental health. *Journal of Occupational and Environmental Medicine*, 62(9), 686-691.
- Wong, T. W., Yau, J. K., Chan, C. L., Kwong, R. S., Ho, S. M., Lau, C. C., Lau, F. L. & Lit, C. H. (2005). The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *European Journal of Emergency Medicine*, 12(1), 13-18.
- Xiao, H., Zhang, Y., Kong, D., Li, S., & Yang, N. (2020). The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Medical Science Monitor: International Medical Journal of Experimental and clinical research*, 26, e923549-1.
- Yıldırım, N., Karaca, A., Cangur, S., Acikgoz, F., & Akkus, D. (2017). The relationship between educational stress, stress coping, self-esteem, social support, and health status among nursing students in Turkey: A structural equation modeling approach. *Nurse Education Today*, 48, 33-39.
- Yu, J., Ren, X., Wang, Q., He, L., Wang, J., Jin, Y., ... & Yao, Y. (2014). The role of social support on occupational stress among hospital nurses. *International Journal of Clinical and Experimental Medicine*, 7(9), 3000.

- Yu, F., Raphael, D., Mackay, L., Smith, M., & King, A. (2019). Personal and work-related factors associated with nurse resilience: a systematic review. *International Journal of Nursing Studies*, 93, 129-140.
- Zhao, F., Ahmed, F., & Faraz, N. A. (2020). Caring for the caregiver during COVID-19 outbreak: Does inclusive leadership improve psychological safety and curb psychological distress? A cross-sectional study. *International journal of nursing studies*, 110.
- Zis, P., Anagnostopoulos, F., & Sykioti, P. (2014). Burnout in medical residents: a study based on the job demands-resources model. *The Scientific World Journal*, 2014.

Table 1. Independent Samples t-Test for Time 1 and Time 2

		F	Sig.	t	df	Sig (2-tailed)
CJD	Equal variances assumed	1.231	.268	.606	222	.545
	Equal variances not assumed			.612	219.239	.541
GJD	Equal variances assumed	.995	.320	.613	222	.540
	Equal variances not assumed			.616	217.207	.538
Meaningful work	Equal variances assumed	.013	.910	.207	222	.836
	Equal variances not assumed			.207	212.989	.837
External job resources	Equal variances assumed	.006	.940	.388	222	.698
	Equal variances not assumed			.390	217.286	.697
Time 1 burnout	Equal variances assumed	.611	.435	-.666	222	.506
	Equal variances not assumed			-.666	213.778	.506

Table 2. Univariate Descriptive Statistics of Latent Profile Indicators

	N	Range	Mean	SD
General job demands	224	0.00-1.00	0.34	0.22
COVID-19-related job demands	224	0.00-0.84	0.29	0.20
Internal job resources	224	0.00-1.00	0.49	0.39
External job resources	224	0.00-1.00	0.29	0.20

Table 3. Bivariate Correlation Matrix

	1	2	3	4	5	6
1. CJD	/	.513**	0.005	0.036	.313**	.375**
2. GJD	.513**	/	-0.076	0.023	.458**	.420**
3. Meaningful Work	0.005	-0.076	/	.348**	-.212**	-.296**
4. External Job resources	0.036	0.023	.348**	/	-.144*	-0.137
5. Time 1 Burnout	.313**	.458**	-.212**	-.144*	/	.681**
6. Time 2 Burnout	.375**	.420**	-.296**	-0.137	.681**	/

Note. Pairwise Ns range from 123 to 224. ** $p < .01$. * $p < .05$.

Table 4. Model Fit Indices of the Latent Profile Analysis

Model	LL	BIC	aBIC	<i>p</i> BLRT	Entropy
1-profile	-2.822	48.937	23.584		
2-profile	45.166	-19.981	-61.181	< 0.000	0.93
3-profile	63.709	-30.009	-87.054	< 0.000	0.85
4-profile	94.243	-64.019	-136.91	< 0.000	0.87
5-profile	107.078	-62.631	-151.367	< 0.000	0.88
6-profile	119.392	-60.200	-164.783	0.004	0.85

Note: LL = Log-likelihood; BIC = Bayesian Information Criterion; aBIC = sample-size adjusted BIC; *p*BLRT = *p*-Value of the Bootstrap Likelihood Ratio Test

Table 5. Profile Allocation Based on Posterior Probability for the Five Latent Profiles. Mean Probabilities of the Latent Profiles. Mean Scores on Each Latent Profile Indicator.

Profile Name	N	%	Latent Profile*					CJD	GJD	Internal JR	External JR
			MW-LJD	Autopilot	Burnout Risk	SR	MW-HJD				
MW-LJD	77	34.3	0.94					0.19 (0.03)	0.24 (0.03)	0.81 (0.03)	0.32 (0.02)
Autopilot	70	31.3		0.96				0.15 (0.02)	0.28 (0.3)	0.15 (0.02)	0.21 (0.02)
Burnout Risk	43	19.0			0.95			0.53 (0.02)	0.53 (0.03)	0.15 (0.03)	0.25 (0.03)
SR	9	3.8				0.93		0.32 (0.11)	0.36 (0.11)	0.83 (0.11)	0.86 (0.05)
MW-HJD	26	11.6					0.80	0.52 (0.06)	0.49 (0.07)	0.93 (0.04)	0.30 (0.06)

Note: MW-LJD = Meaningful Work – Low Job Demands; SR = Sufficient Resources; MW-HJD = Meaningful Work – High Job Demands.

CJD = COVID-19-related Job Demands; GJD = General Job Demands; JR = Job Resources.

Information for latent profile indicators is presented as M (SE)

* Average probabilities for profile membership

Table 6. Mean Burnout Score of Each Latent Profile for Time 1 and Time 2

	Profile Names	Burnout	S.E.
Time 1	MW-LJD	0.96	0.09
	Autopilot	1.16	0.10
	Burnout Risk	1.71	0.10
	SR	0.72	0.24
	MW-HJD	1.44	0.18
Time 2	MW-LJD	0.88	0.14
	Autopilot	1.16	0.10
	Burnout Risk	1.85	0.17
	SR	0.84	0.26
	MW-HJD	1.32	0.37

Table 7a. Chi-Square Test Statistics for Pairwise Comparisons of Latent Burnout Scores (Time 1, July 2020)

	<i>X</i> ²
Overall test	36.02**
<u>MW-LJD as the Reference Profile</u>	
Autopilot	2.29
Burnout Risk	30.24**
SR	0.89
MW-HJD	4.98*
<u>Autopilot as the Reference Profile</u>	
Burnout Risk	13.70**
SR	2.95
MW-HJD	1.83
<u>Burnout Risk as the Reference Profile</u>	
Burnout Risk vs. SR	14.39**
Burnout Risk vs. MW-HJD	1.70
<u>Sufficient Resources as the Reference Profile</u>	
MW-HJD	5.46*

*Note: **p < .001, * p < .05*

Table 7b. Chi-Square Test Statistics for Pairwise Comparisons of Latent Burnout Scores (Time 2, August 2020)

	X^2
Overall test	22.68**
<u>MW-LJD as the Reference Profile</u>	
Autopilot	2.40
Burnout Risk	19.96**
SR	0.03
MW-HJD	1.09
<u>Autopilot as the Reference Profile</u>	
Burnout Risk	11.74*
SR	1.29
MW-HJD	0.18
<u>Burnout Risk as the Reference Profile</u>	
Burnout Risk vs. SR	10.63*
Burnout Risk vs. MW-HJD	1.75
<u>Sufficient Resources as the Reference Profile</u>	
MW-HJD	1.07

Note: ** $p < .001$, * $p < .01$

Figure 1: Proposed Latent JD-R Profiles

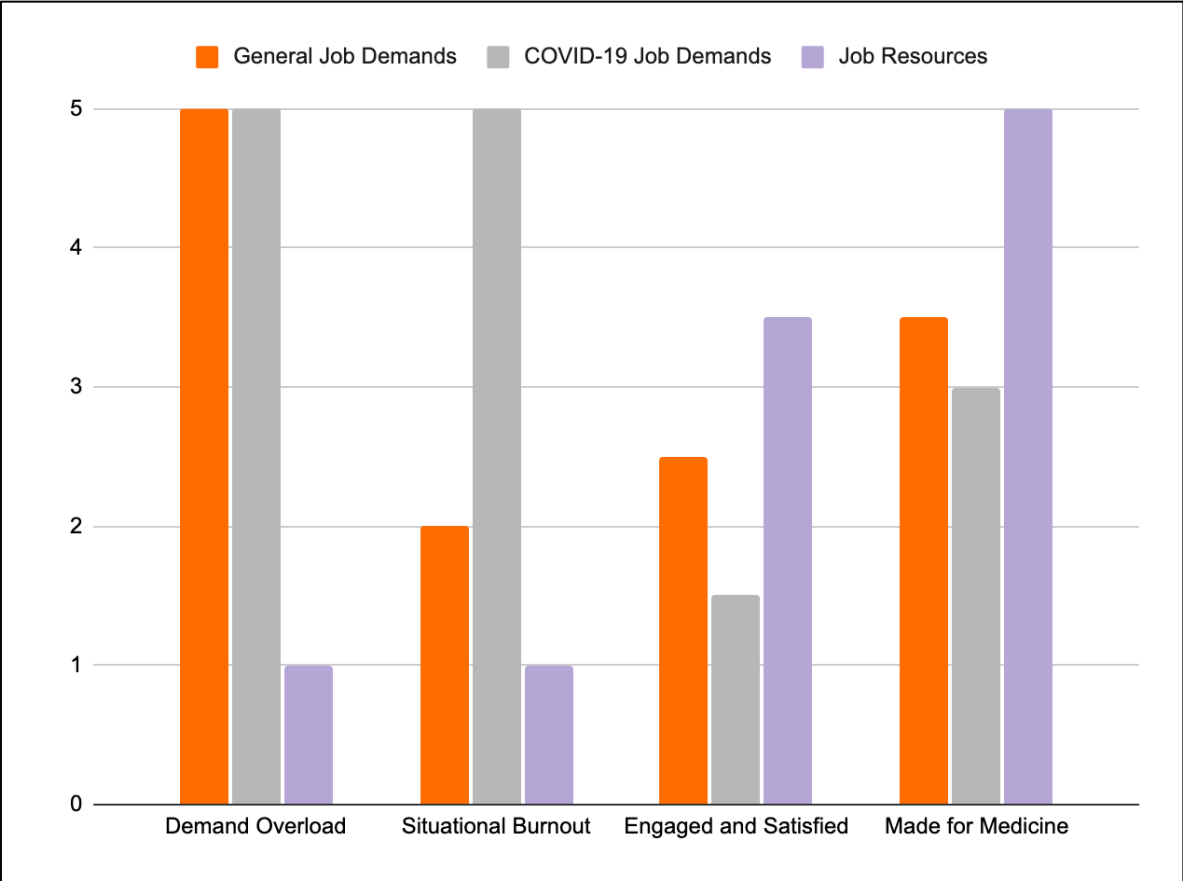


Figure 2. Latent JD-R 5-Profile Solution Bar Chart

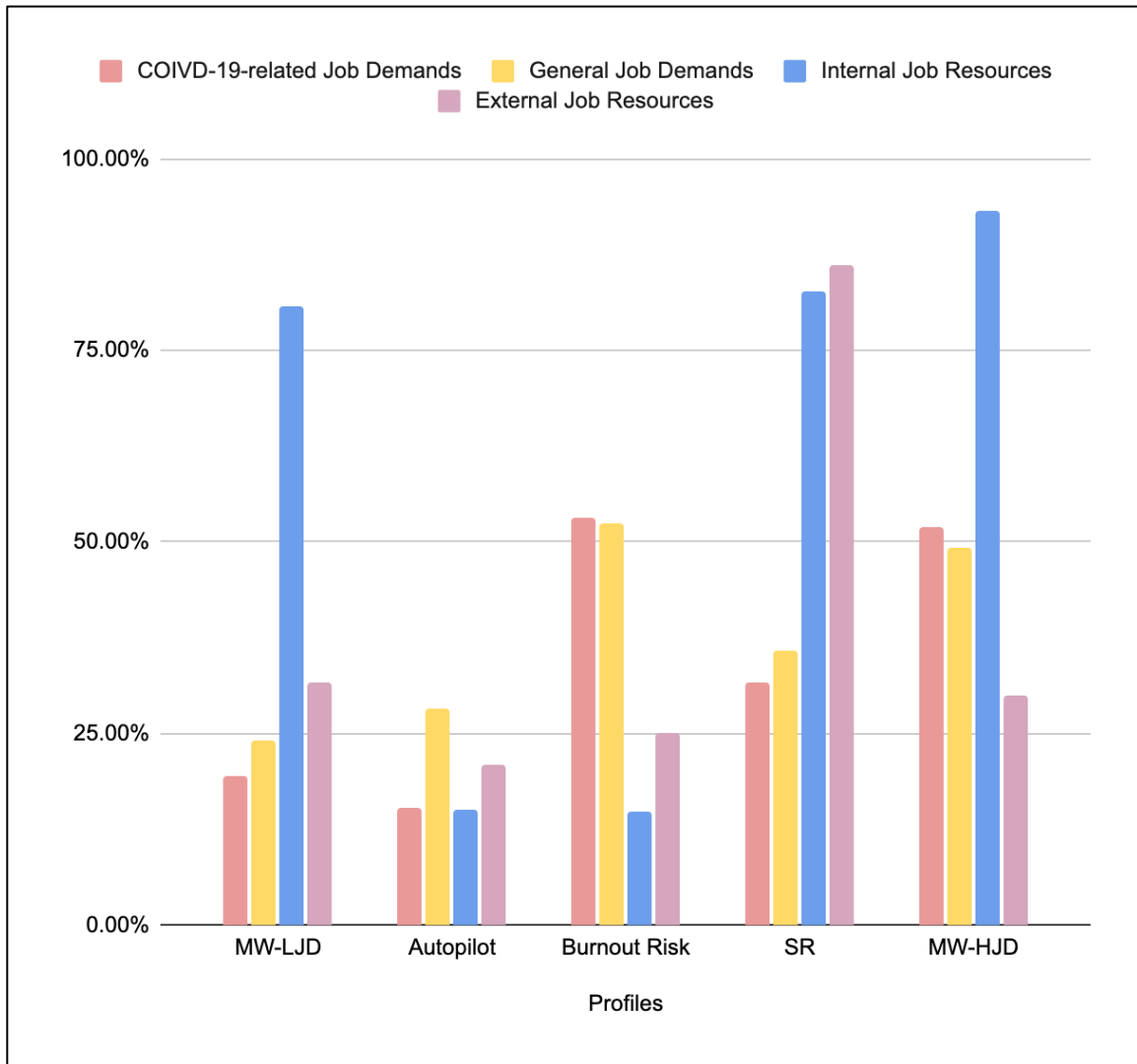
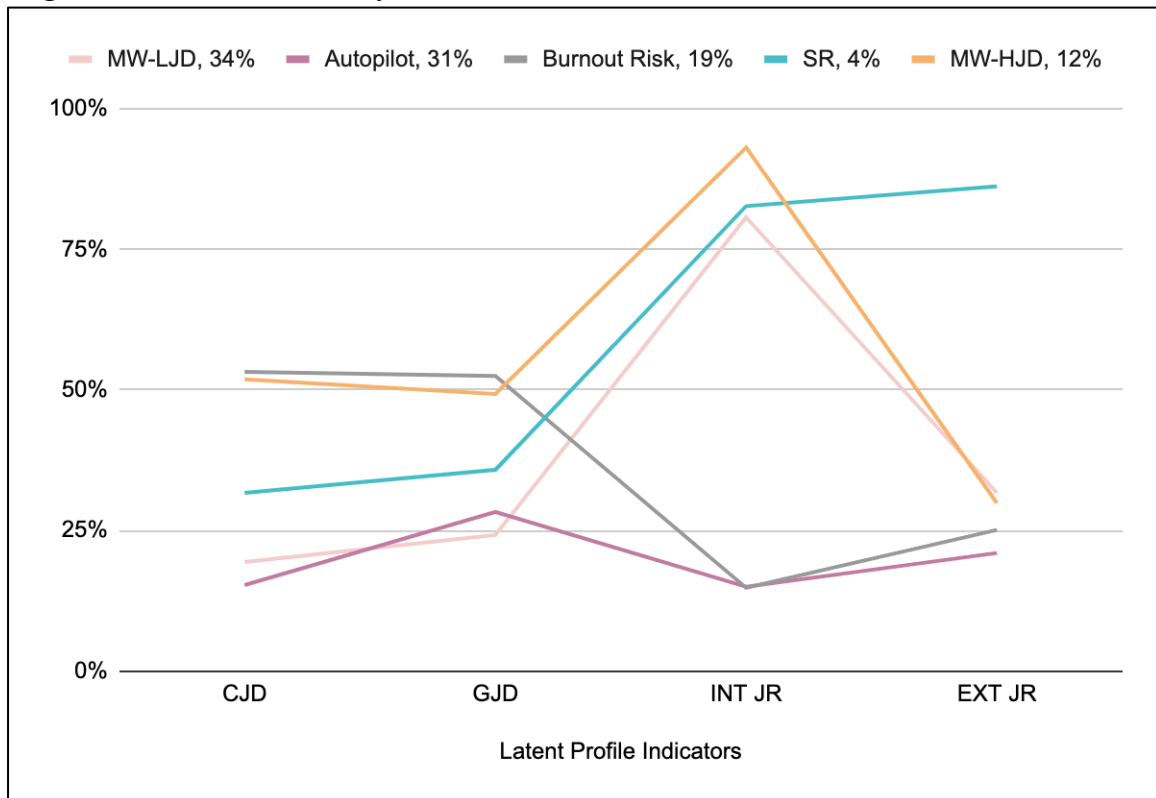


Figure 3. Latent JD-R 5-Profile Solution Line Chart



APPENDICES

Appendix A

“Mini Z” self-defined single item burnout measure

Using your own definition of “burnout”, please select the answer below that best describes how you’ve felt in the last month:

- I enjoy my work. I have no symptoms of burnout.
- I am under stress, and I don’t always have as much energy as I did, but I don’t feel burned out.
- I am definitely burning out and have one or more symptoms of burnout (e.g., emotional exhaustion).
- The symptoms of burnout that I am experiencing won’t go away. I think about work frustrations a lot.
- I feel completely burned out. I am at the point where I may need to seek help.

Appendix B

COVID-19 Demands Measure

Which of the following have you experienced or been concerned about in the past month?
Check all that apply:

- ☐ Shortage of PPE
- ☐ Feeling ill-prepared to manage escalating work demands
- ☐ Shortage of supplies needed to treat patients
- ☐ Shortage of medications needed to treat patients
- ☐ Fear that the risk of COVID-19 exposure is not under my control
- ☐ Too few personnel to watch as you don/doff PPE
- ☐ PPE is not standardized among facilities
- ☐ Concern that my education/training is being negatively impacted by the pandemic
- ☐ Frustration with societal misconceptions and/or misinformation that impede my ability to care for patients quickly and effectively
- ☐ Increasing conflict between professional responsibilities (e.g., duty to patients and the hospital) and personal responsibilities (e.g., keeping my family and friends safe)
- ☐ Lack of advanced planning and resource availability at a local/national level
- ☐ Concern that my colleagues will get sick
- ☐ Fear of getting sick and/or dying myself
- ☐ Fear of my loved one getting sick and/or dying
- ☐ Difficulty sleeping due to increased stress from the pandemic
- ☐ Difficulty making arrangements for dependent care (e.g., children, elderly relatives)
- ☐ Fear of being at a higher risk of medical malpractice

Appendix C

General Job Demands Measure

Which of the following are you currently experiencing or concerned about? Check all that apply:

- ☐ Staffing concerns in the ED (e.g., too few doctors, too few nurses, too few staff)
- ☐ Staffing concerns in the hospital (e.g., too few doctors, too few nurses, too few staff)
- ☐ Difficulty admitting or transferring patients
- ☐ Fear of putting my job at risk if I share work-related problems, concerns, and/or tough issues with leadership
- ☐ Lack of support from the hospital/organization
- ☐ Too many bureaucratic tasks (e.g., charting, paperwork)
- ☐ Electronic health record issues
- ☐ Spending too many hours at work
- ☐ Communication problems (e.g., unclear, delayed, conflicting, or too much information)

Appendix D

Job Resources Measure

Which of the following have been helpful to you in the past month? Check all that apply:

- ☐ Knowing that my work is meaningful (I)
- ☐ Knowing I am helping to address the COVID-19 pandemic (I)
- ☐ Having a positive impact on patients and their families (I)
- ☐ EM Microsoft Teams (E)
- ☐ EM Town Halls (E)
- ☐ Emails from EM leadership (E)
- ☐ Shift huddles (E)
- ☐ Emails from ED nursing leadership (E)
- ☐ Staff meetings (E)
- ☐ Daily communication from the health system (E)
- ☐ Support from coworkers on shift (E)
- ☐ Support from my supervisor (E)
- ☐ Communication and support from mentors (E)
- ☐ Scheduled wellness sessions (E)

(I) = Internal Job Resources

(E) = External Job Resources